VOLUME 11 #3 MARCH 1996 PRICE $6

EXPERIMENTAL MUSICAL INSTRUMENTS

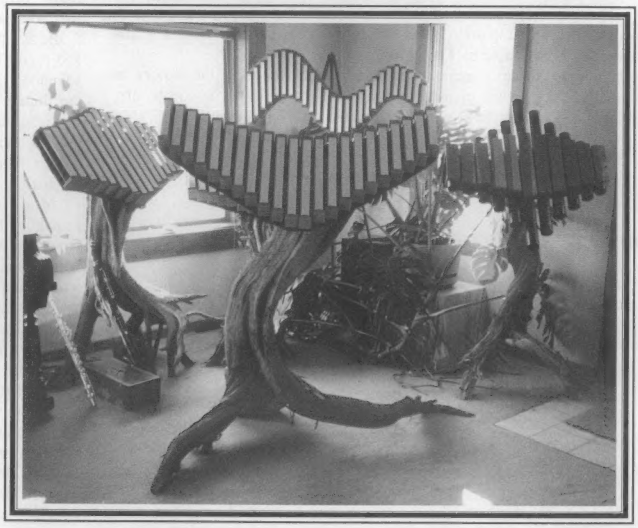
For the Design, Construction, and Enjoyment of Unusual Sound Sources

OVERTONES OUT FROM UNDER

If you take a musical bow — that is, a single string held taut on a flexed stick, as on an archer's bow — and if you play it with one end of the bow held close in front of your mouth, you will find that you can bring out the string's overtones selectively, by altering the size and shape of the mouth cavity. This is the instrument referred to generically as a *mouth bow*, known in various forms through many parts of the world. The principle is much the same as that of a jaw harp. As with the jaw harp, the sound consists of a fundamental tone going continuously, with an ever-changing melody of mouth-controlled overtones sounding above it. But that overtone melody tends to be awfully quiet, often buried beneath the droning fundamental. Could there be a way to create a mouthbow whose overtones are more prominent? This is the question that Wayland Harman asks in this issue of *Experimental Musical Instruments*. You can follow his investigations in the article starting on page 25.

And here's another question, of a rather different sort: Is it possible to make a decent return in designing and selling unconventional musical instruments? The first two of a set of four articles on the marketing of musical instruments can be found here, with two more to come in the following issue. Also in this issue we have a look at the didgeridoo in two worlds, and a discussion with Rex Lawson, perhaps the planet's only concertizing pianolist. There are ideas for a home-buildable rotating Leslie speaker effect, and a batch of wonderful low-tech tricks for other classic and not-so-classic effects in recording.

And there's much more, but I'll stop here. Open, and read.



Above: Mallet instruments created by Richard Cooke. See the article starting on page 22

...NO, THE MONOCHORD WAS NOT completely silenced in the time span between Robert Fludd and Hermann Helmholtz. [This in response to Sasha Bogdanowitsch's monochord article in *EMI*'s December 1995 issue, which described this as a period of obscurity in the instrument's history.] In fact, it was brought back as an instrument in its own right in Scandinavia and the Baltic countries, roughly from 1820 and a hundred years on.

It was the custom well into the 19th century for congregations to sing psalms with excessive individual embellishments and in more or less total freedom rhythmically, in churches and places devoid of organs or similar means of musical guidance. A Swedish minister, J. Dillner, devised a simple monochord together with a numerical notation system to foster psalm singing. Revivalist movements current at the time brought about the success of the instrument as an instrument for both home and smaller congregations with the unfortunate result that the floral embellished singing became a lost art.

Song books were printed with Dillner's system and the instrument developed some. The box cross section was sometimes changed to triangular, for a shape sometimes more pyramidal than square or even violin shaped. Resonating strings were used to enhance the quality of sound. Size was fairly uniform, about one meter in length with a compass of 30 notes.

Especially in Norwegian country schools, the psalmodikon was used in basic music education.

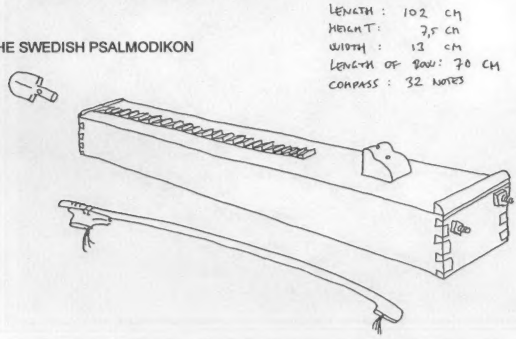
I have one instrument of uncertain age but probably from late 1800. Construction is straightforward with sides of the type that was used in measuring boxes and good basic furniture. A heavy U-bar with square nuts suspended two resonating strings and there is a tuning peg at the small end, the string being fastened directly into the bridge. The bow is homemade with a crude tightening device consisting of a few loops of iron wire and notches in the bow.

The whole instrument is unadorned, unpainted but handled to a smooth finish. Notches on top are numbered 1 to 8 for each octave, with a + and - and a few x to denote half notes.

I thought this instrument represented a parenthesis in the history of Swedish music and am pleased to find a few of my favorite composers, Partch and Harrison, to be part of the monochord movement!

Peter Lundberg
Hagforsgatan 35, 416 75 Göteborg, Sweden

THE SWEDISH PSALMODIKON



I LOVED THE ARTICLE on monochords. I've constructed another one of my Meccano instruments called "the Motorchord," which is a motorized monochord (gee whiz). The motorized component is a small car-like object that slowly treks to and fro along the length of the monochord's frame, gently rubbing the monochord string as it travels. I ought to photograph it and bring the pictures ...

Colin Hinz
(hinz@dvs.com

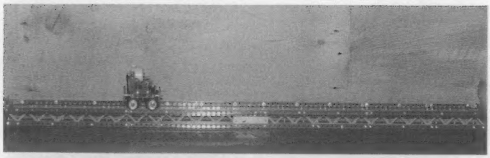
... and bring pictures he did, in a visit to *EMI* that followed the above message. They can be seen on the facing page.

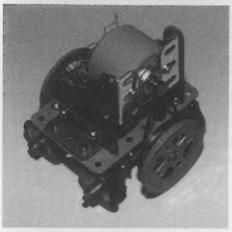
JOHANNES BERGMARK'S ARTICLE "Call for the Hidden Sounds" (*EMI*, June 1995) was quite interesting. Mr. Bergmark indicated that many of his ideas for new musical instruments are first visualized in his dreams. For example, he wrote, "In a dream, I have now seen a flute which is also a two-stringed bowed instrument. The finger board of the stringed instrument coincides with the body of the flute. A normal descending scale on the flute would result in an ascending one on the string instrument!"

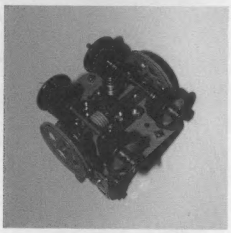
This passage was quite surprising to me because, coincidentally, I had finished building a very similar instrument just a few months before the article was published. The enclosed picture (facing page, below) shows a ceramic stoneware instrument I call the "stone fiddle". It's a two-stringed bowed instrument, similar to the violin and the Egyptian *rebabba*. The neck of the fiddle is a flute (in the picture you can see the blow hole and finger holes on the side of the neck). The goatskin soundboard or resonator of the fiddle can be played with the fingers as a drum. As a player, it's fun to explore how the three systems interact. For example, when playing the instrument as a flute, the drum head and strings vibrate sympathetically and produce their own sounds.

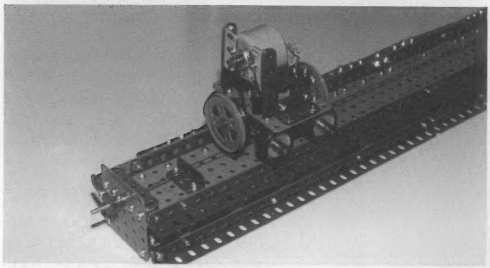
Mr. Bergmark's description may have implied that somehow the flute and string portions of his instrument would be played at the same time, and that the finger holes of the flute would be directly underneath the strings so that depressing the strings to the " fingerboard" would also stop the tone holes of the flute. The stone fiddle was designed with the intention that the two "instruments" be played separately, although it is possible to use the percussion section of the instrument in conjunction with the flute or fiddle.

The most difficult aspect of creating this instrument was finding an appropriate bridge. After trying many different wooden shapes and objects, the one that sounded the best was an old violin peg that I had been using as a temporary substitute for a bridge. So the bridge I built of wood is shaped similarly to a violin peg, with a long protrusion toward the bass side of the instrument.



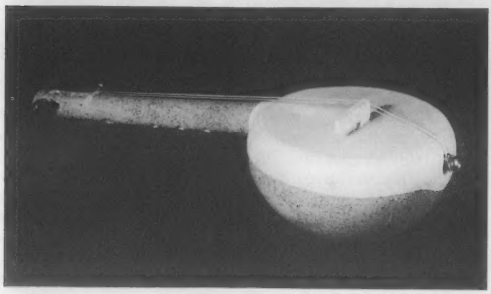






ABOVE: "Motorchord" automatic mechanical instrument ("Meccanion Instrument") by Colin Hinz (developed December1993; revised October 1995).
1. Overall view of the Motorchord. The instrument is displayed in all its 50" of glory, showing the orientation of the string exciter car.
2. Top view of the exciter car by itself, showing the belt drive between the motor and the string exciter wheel.
3. Underside of the exciter car, showing the speed reduction gearing which couples the four drive wheels to the string exciter wheel shaft. The four drive wheels have all-rubber tires to prevent motor vibrations from being coupled into the vibrating string.
4. Close-up view of one end of the Motorchord base, showing in detail the positioning of the exciter car and the string tensioner, at left. The large wheel which is transverse to the string is the string exciter wheel.

BELOW: Barry Hall's *Stone Fiddle*, incorporating elements of fiddle and flute.



IN THIS ISSUE

EXPERIMENTAL MUSICAL INSTRUMENTS
For the Design, Construction and Enjoyment of Unusual Musical Sound Makers

ISSN 0883-0754. Printed in the United States

EDITOR: Bart Hopkin ASSISTANT EDITOR/OFFICE MANAGER: Kim Johnson

PROOFREADER: Janet Hopkin

EDITORIAL BOARD: Donald Hall, Roger Hoffmann, Jon Scoville, Robin Goodfellow

Published in March, June, September and December by Experimental Musical Instruments, P.O. Box 784, Nicasio, CA 94946. Phone / fax (415) 662-2182. E-mail ExpMusInst@aol.com.

Subscriptions US$24/year ($27 in Mexico and Canada; $34 overseas). Back issues & cassettes available;write for prices or see ads in this issue.

ADVERTISING POLICY: Experimental Musical Instruments will run ads which are potentially interesting or valuable to the readership. Please write for advertising rates. Subscribers can place "classified" ads of up to 40 words without charge.

SUBMISSIONS: Experimental Musical Instruments welcomes submissions of articles relating to new or unusual musical instruments. A query letter or phone call is suggested before sending articles.

The acoustics and bridge requirements of a skin-based "soundboard" seem to vary greatly from those of a wooden model. If any readers can shed some light on appropriate bridge designs, I would greatly appreciate it if they would contact me.

If you would like to hear the stone fiddle, and you have access to the world wide web, please visit my ceramic musical instrument site, called "Burnt Earth", at http://www.ninestones.com/burntearth.shtml. You will be able to see color photos, read about, and listen to sound samples of many of the ceramic musical instruments I have built. I can be contacted via internet mail at barry@ninestones.com or via regular mail at 172 Springside Rd., Walnut Creek CA 94596.

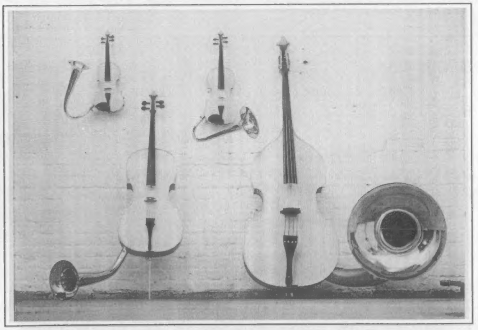
Barry Hall

ON THE SUBJECT OF THE STROH VIOLIN [featured in Cary Clements' "Augustus Stroh and the Famous Stroh Violin" in *EMI*, June 1995 issue], are you and Cary Clements aware of the piece. '1898' by Mauricio Kagel — I suppose ten million readers have alerted you to it already. [Actually, you're the first — ed]. It features Stroh-like string instruments in the recording and nice colour photographs on the sleeve.

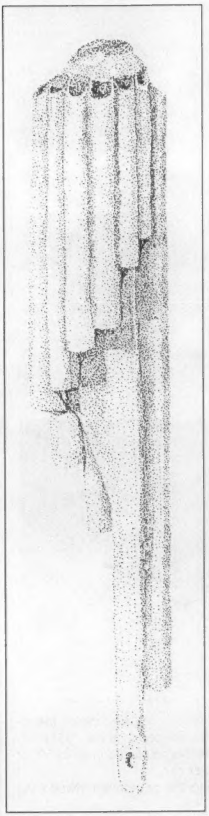
The piece was written for Deutsche Grammophon's 75th birthday (in 1973), and until reading your article, I thought the violin, viola, cello and double bass with their horns attached were some sort of Surrealist/Dada invention of Mauricio's, notwithstanding the sepia photograph on the sleeve showing an ensemble of Stroh instrument players recording for Deutsche G in 1910. If you don't have it, the European catalogue number of my disc is 2543 007.

Roger Merrick
100550.2266@compuserve.com

From the editor: Thanks to Roger Merrick for sending a dub of the lp and photocopies of the liner notes and photos, one of which is reproduced here. Mauricio Kagel has been an important player in the field of composerly instrument innovations, regrettably under-recognized in these pages in the past. We'll get a review of the disk into print before too long.



ABOVE: A quartet of instruments showing Stroh-like horns, but seemingly without the Stroh pivotting bridge mechanism. Reproduced by photocopy from the liner notes for Mauricio Kagel's 1973 lp *1898*.



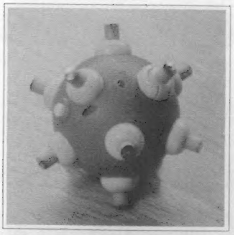
NOTES FROM HERE AND THERE

REINHOLD BANEK AND JON SCOVILLE's classic 1980 book of home-buildable plans for unconventional musical instruments, *Sound Designs,* is now out and available at bookstores in an updated 1995 edition from Ten Speed Press in Berkeley. To provide a sense of what this unassuming paperback has meant to people over the years: in this issue of *EMI* we have the opening portions of a set of articles on making musical instruments for sale. Two of the three outside authors slotted to appear in the series — both of them now actively making and marketing unconventional musical instruments — cite the Banek and Scoville book as a seminal influence. They did this without any consultation or prompting. Both just happened to think that this source of their inspiration was important enough to merit special mention in their articles.

A COUPLE OF ISSUES AGO, in September, 1995, *EMI* had an article on sound-making children's toys. Naturally, the article presented only a sampling of sound toys; there will be no end to the list of sound-worthy toys that the article failed to mention, or of new toys as they appear in the toy stores. Here are a couple more that have come up since the article appeared. (In households with kids, they have a way of showing up around Christmas time).

The Fly Swatter from Cap Toys is essentially a badminton set — two rackets and the equivalent of a birdie — with this difference: the birdie is made in the shape of a (rather large) housefly. An air passageway, starting with a large opening in the nose, runs through it. Embedded in the passageway is a beating reed, of the same sort described for several other toys in the original article. When the fly flies, air rushes through the passage and sounds the reed. The reed is a bit larger than what you'd find in a squeaky toy, and not too rigid, so that it produces a low, droney sort of sound, reminiscent of a fly's buzz. It doesn't sound if the fly isn't flying fast enough, or if it's wobbling too much; still, it buzzes much of the time and certainly dramatizes the badminton game — which now becomes more like an exercise in fly swatting.

Ray Brunelle, a sound effects maker and recordist, recently sent along something called the Jitter Ball. (Actually what he sent was Jitter Ball Junior, the smaller version of a larger toy.) "It's wacky!!!" says the packaging, a "Motorized, Bouncing, Wiggling, Hopping, Crazy Ball." The jitter ball is a ball with short, leg-like protrusions all around it (see the photograph). Inside is a



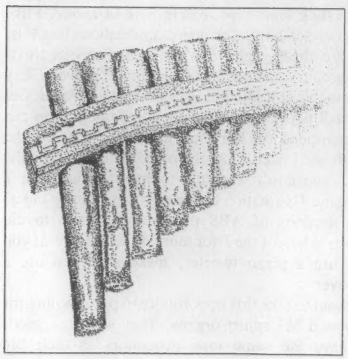
Jitter Ball, from Lanard Toys, Ltd.

battery-operated motor with (one surmises) an eccentric weight attached, which causes the ball to dance about with a quick, jerky, unpredictable movement when the motor is turned on. The toy's promotion doesn't mention its sound capabilities, but it is a noisemaker: Ray puts thumbtacks into the ends of the legs " to bring out the rhythmic and percussive qualities of the toy when placed on hard surfaces such as inside a metal wastebasket, on a glass surface, on top of a drum, on the strings of a grand piano, etc."

And just to fill in some missing information: The sonorous plastic baseball bat with resonant air column mentioned in the original toys article, the name of which had been lost, is called the Mongo Bat, manufactured by Aviva Sports, Mattel. I have also discovered that the whoopee cushion that served as a model for the description in the article wasn't representative. It required a popsicle-stick to be inserted to stretch flat neck of the balloon-like cushion in order to retain its air do the appropriate bi-labial when squeezed out; better models have more restricted necks to begin with and don't require the stick.

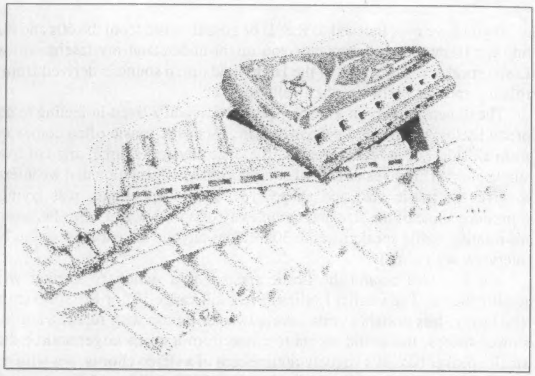
And here's another instance of simple acoustic sound technology as a peripheral to commercial enterprise. Pacific Salmon Industries, in Vancouver, produces a gift-pack of smoked salmon packaged in what turns out to be a fully functional frame drum. The drum is circular, 11" in diameter, with a strong cardboard body (made, one suspects from " sonotube," the cylindrical cardboard concrete form used for pouring pilings and pillars). The head is mylar under high tension, apparently glued in place, and decorated with a Native American eagle design. The tone is excellent. The package is available through the Norm Thompson mail order catalog. The salmon tastes pretty good, too.

A COUPLE OF NEW PUBLICATIONS: *Noise Gate*, a new magazine from Sheffield, England, appeared in October, 1995. If this first issue is any indication, it will be a good read for anyone interested in new and unusual musical instruments and sound sources. For an address and précis of instrument-related articles, see "Recent Articles in Other Periodicals" at the back of this issue of *EMI*.



The British Harry Partch Society has gone online with its newsletter devoted to the work of the leading 20th century microtonalist. You can reach the BHPS through editor Roger Merrick at 100550.2266@compuserve.com, or by mail at 33 Arthur Road, Erdington, Birmingham, B24 9EX, England.

COMMUNICATING WITH US: Our fax machine here at *EMI* is doing a poor job of recognizing incoming faxes. If you intend to fax to *EMI*, we recommend that you call by voice phone first, during Pacific Standard Time waking hours, to allow us to receive your transmission. Our fax/phone number is (415) 662-2182. Our e-mail address is ExpMusInst@aol.com; our mail address remains PO Box 784, Nicasio, CA 94946, USA. We have a web site at *http://www/thecombine.com/emi/*.



NO SOUND THEATER this issue: Reed Ghazala's regular article does not appear in this issue. A dusty disaster in his home and work area, involving the explosion of the collection bag of an industrial sander, has created such havoc in a house of dust-sensitive instruments and equipment that he was unable to do the writing this quarter. He will be back next issue. In the meantime, we wish Reed luck and fortitude in setting things back to normal.

CORRECTION: Speaking of the Ghazala articles, a peculiar quirk of our layout software led to the loss of a portion of one of the captions in his latest. The caption for Figure 4 of his article "From the Music Wing of the Dream Museum: Sky Harps" in *EMI*'s December 1995 issue should have read:

Figure 4: Atmospheric disturbance and unusual cloud formations often accompany sky harps. A fine rain fell during this occurrence. All recordings, however, have gradually faded over the years into the Monkees theme song.

Stipple drawings on these pages: panpipes in various shapes and forms, from various parts of the world, from the pen of Robin Goodfellow.

ROTATING TWEETER HORN

By Keith Cary

If you have ever listened to R & B or gospel music from the 60s and tuned into the Hammond organ player you might understand my fascination with Leslie speakers. A big part of the Hammond organ sound is derived from the rotating speaker baffles of the Leslie speaker.

The dimensionality of a Leslie speaker can add a lived-in feeling to some pretty lifeless electronic keyboard music. Acoustic music often comes to us from all sides, or at least from a fairly large physical source, and not from a single point. This gives us a lot of complex phase information that we interpret to give the music size and shape. Mr. Leslie apparently was trying to reproduce some of the size and complexity of a pipe organ when he invented his rotating baffle speaker in the 30s. (Does anyone have a copy of the NPR interview with him?)

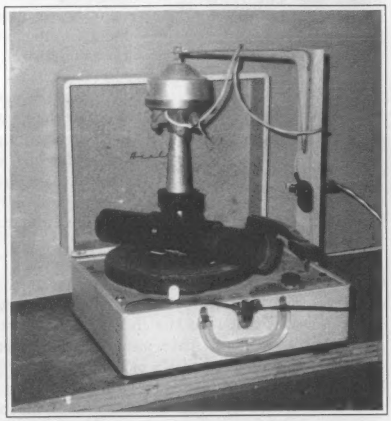
The key idea behind the Leslie speaker is a stationary speaker with a rotating baffle. The smaller Leslies have a full-range 10" or 12" speaker only. The larger, less portable units have a tweeter on top with rotating horns. At slower speeds, the sound seems to come from a much larger source than a single speaker box. It's vaguely reminiscent of a stereo chorus, but with much more complexity. At high speeds, the effect is of a wild tremolo/vibrato. The transitions between speeds are delayed by mechanical inertia and are hard to describe without mentioning space travel and Cape Canaveral.

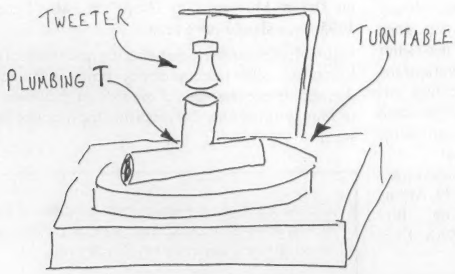
I have a Hammond M3 spinet organ driving a small Leslieoid Baldwin speaker (several manufacturers have made speakers very similar to the Leslie). It sounds great but it is weak on highs because it lacks a tweeter. For years I've tried to imagine some small portable unit that could sit on top of a woofer Leslie or guitar amplifier. I even went to the city corporation yard to ask them about those rotating lights on top of city vehicles.

The problem is connecting wires to a rotating transducer. Some manufacturers used slips rings, similar to brushes in a motor. I found out that these can be quite expensive. Leslie kept the driver stationary and rotates just the horns. This seems to be a less complicated solution.

For my cheap Leslie I use an ABS plumbing *T* for the horns, an old phonograph to rotate it and a piezo tweeter suspended above the center of the *T* with its mouth pointed down. The sound comes out of the side ports of the rotating *T* while the tweeter remains stationary.

Get a cheap phonograph or turntable at your neighborhood thrift store or garage sale. You'll get a better range of sounds if you get one with a 78 RPM speed. Buy a 1½" ABS *T* (that is, a T-shaped plumbing fixture) in the plumbing section of your local hardware store. A *T* is not perfectly symmetrical but it doesn't seem to matter. Drill a 9/32" hole in the *T* so that it can sit on the spindle of the turntable with the middle leg known as the "lateral" of the *T* pointing straight up. It is pretty important that the center opening of the *T* be centered on the turntable spindle so the whole thing doesn't wobble and scrape on the tweeter. I drilled a smaller hole by eye and then filed it until it was centered. A more elegant solution would be to drill a 9/32" hole in the center of an inch and a half plug or wooden disk, preferably using a drill press. You could then use that to center the hole in the *T*.





To suspend the tweeter I used a fairly big shelf bracket attached to a wooden stake which I screwed to the side of the phonograph. Make sure you allow clearance for the arms of the *T*. My tweeter has a bolt on the back which conveniently fit a hole on the shelf bracket. With any other tweeter I would probably use double stick foam tape, baling wire or epoxy. I like piezo tweeter horns for weird applications like this. They are cheap, light, don't need any special crossover circuitry and can handle plenty of power. They are available at Radio Shack, among other places. Get the small tweeter with the round opening. You can either suspend the horn just above the *T* or cut the ears off and lower it into the mouth of the *T*. I did the latter. You don't want the tweeter to touch the *T* during the *T*'s rotation but you do want it to be close. Short sections of ABS pipe can be fitted to the horizontal legs of the *T* for more directionality. If you don't use a piezo tweeter, make sure you use a crossover.

I want to take this opportunity to put in a plug for Hammond M3 spinet organs. They sound as good, and have the same tone generators as their big

brother, the Hammond B3, but they are smaller and much cheaper. I often see them for sale in the classifieds for under $200. Hammond drawbar organs aren't like any other keyboard. I hate to think of these fine instruments going to the landfill.

Your turntable Leslie can be plugged into the external speaker jack of a guitar amp or added in parallel to most other speakers. Be careful if you're adding it to the built-in speaker on a M3 or similar organ. The old ones from the early 50's and before sometimes used field coil speakers, which entailed sending high-voltage to a separate winding instead of using a permanent magnet. If your speaker has 4 or 5 wires going to it I advise you to get some help.

Maybe one of you can figure out how to change turntable speeds by remote control, a very desirable trick. Someone else might like to try this using a four inch *T* and a four inch speaker for more mid-range tones. I'd like to find an easy way to get the speed up above 78 RPM for that wild Leslie flutter.

Here are a couple of catalogues that I've found useful and fun for this and other weird projects:

MCM Electronics 1-800-543-4330
This is a good and very reasonable source for piezo tweeters and all other speakers. They also stock all kinds of TV repairman tools and supplies.

All Electronics Corp. 1-800-826-5432
My favorite surplus electronics catalogue. All kinds of weird stuff, including "Special Sound Effects Arsenal" (4 units for $4.00). An excellent source for piezo elements.

I don't know how this fits into the scheme of this article, but after I finished writing it I was introduced to another approach to rotating speakers: speakers that actually rotate. Inside a 60's Wurlitzer organ (to my ear, a dumb sounding instrument) I got at a thrift store for $10 I found this device with two 4" speakers mounted back-to-back in a can balanced by a counterweight. The whole thing spins around at what seems dangerously fast. The speakers are connected to the outside world by slip rings. Two different motors drive this thing. It is easily removed from the organ without trashing either one and it sounds pretty cool.

Keith Cary is a stringed instrument repairer and builder, as well as a musician. He spends a lot of quality time at thrift stores, garage sales and junk yards. If you have any questions or ideas about the subjects discussed here, please write or call Keith at 4044 Central Lane, Winters, CA 95694; phone (916) 795-3173.

TWEAK THOSE TONES!

John Herron, The Sound Merchant

I love to record sounds! When I was a young boy an older friend of mine named Allen Willie gave me his Philips reel to reel recorder as a going away present. I learned to record sounds and stumbled across ways to modify these by speeding up or slowing down the tape, over-dubbing other sounds to create huge clusters of color, playing the tape backwards, and looping the tape.

Years passed and I traveled all over the country playing in road bands as a drummer. I collected odd percussion instruments for years and finally bought a four track cassette recorder. Wanting to mutate or enliven my instruments on tape, but not being able to afford an expensive digital EFx unit, I came up with several ways to tweak my tones through "homemade" methods. I now have a recording studio of my own with lots of cool sound processing gear, but still use these methods because of the sonic personality they add.

Wanting to add sparkle to a sax track that Dale Carlson was doing for me, I set up a series of large bronze gongs and put my mics so close to them that they almost touched. Dale then proceeded to blow his brains out on sax, playing into the gong. The attack and character of the sound changed depending on which side of the gong he played to, where on the surface (closer to the rim or center) and his distance from the gong.

An amazing way to get reverb on my drum set is by setting up a large double headed 30 inch bass drum in front of the set on a stand. I've cut a 4-inch hole in one head where a mic can be inserted. The further the mic is in the drum, the more reverb there is on tape. Simply back the mic out gradually to dry the sound up in degrees. Best of all I can tune the drumheads for a tunable reverb that is really effective.

I've done more tunable reverb tricks using contact mics on a piano soundboard and then tuning the piano strings so they sing along to make my drum set tracks more melodic. Placing a small speaker inside a timpani, miking the drumhead, and then moving the pedal to vary drumhead tension while something plays through the speaker is cool for mutant pitch bends.

I've picked up a really great but inexpensive wireless mic from the ever faithful Radio Shack. Mounting the mic on an old turntable on high speed creates the warbling Leslie effect. Placing the wireless mic in an airtight bag and putting it in a tub of water gets you that deep sonic texture that Hendrix used on the *Electric Ladyland* album.

May you be as adventurous recording your sounds as you are making and playing them.

John Herron's many original instruments complement his extensive collection of ethnic instruments. The instruments can be rented for plays, films, etc. Tapes of his percussion-based music are available for $5.00 or trade. John can be reached at 365 South 544 East, Salt Lake City, Utah 84106, phone 268-6046.

THE DIDGERIDOO

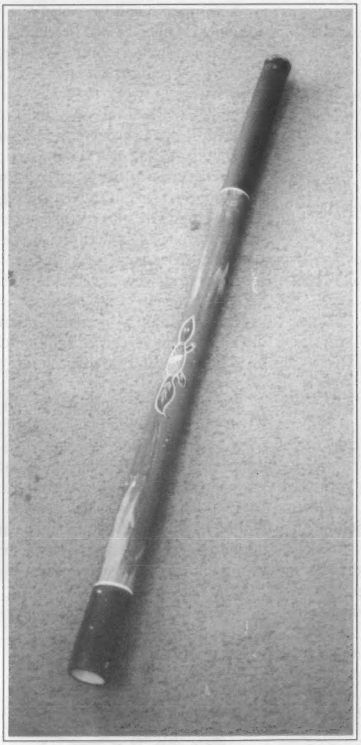
by Steve Wilson

'Didgeridoo' is an accurate onomatopoeic name for this musical instrument. Repeat didgeridoo over and over and it sounds like the sound that comes out of one, especially if you say the word low and in the throat. This is the sound we all identify with the didge — a droning, rhythmic vowel sound, as if somebody were humming while opening and closing their mouth cavity.

In traditional Aboriginal music didges are played, by men only, as accompanying instruments. The principal musician is usually the singer, who is often relating a Dreamtime story of creation. Some of these songs last weeks, and even months, during which there will be several singers, and usually one musician with clapsticks and one playing the didgeridoo. Aborigines have developed a technique of circular breathing to produce a continuous sound, allowing them to breath in through the nose while still vibrating their lips with an out breath through the mouth.

Lately didgeridoos have become popular with world musicians, and didge music features in practically any film set or made in Australia: *Walkabout*, *Til the End of the World*, *Where the Green Ants Dream*, *Mad Max Beyond Thunderdome*, *The Right Stuff*. It has even gone classical: musician Charlie MacMahon played the didge with the London Philharmonic.

The didgeridoo is a very simple aerophone, and unusual in its manner of being played. While many other primitive horns are played like bugles, in short, high-pitched blasts, the didge is played with a continuous low hum.[1] The beginnings of the didjeridoo are unknown, but are generally dated about 2,500 years back, using cave paintings as a reference.



American-made Didgeridoo by author Steve Wilson

Didgeridoos are built and played across the tropical northern regions of Australia, including: Arnhem Land, where Crocodile Dundee was filmed, northern Queensland, Western Australia, and islands in the Torres Strait. Didges were never developed by tribes in the dry center and southern regions, probably because of the lack of materials.

"Didges come from trees — all different types of eucalyptus trees, about 200 species — still living, that are hollowed out by termites," said Fred Tietjen, a Bay Area didgeridoo musician and collector. "The digestive system of what they call white ants there, is able to eat out the inner core of the trees. Once they reach the hard wood in the outer surface they move on. The termites migrate through living trees finding new food material."

Aborigines travel into the bush looking for suitable trees, trees with delightful names like yellow box gum tree, bloodwood, stringybark, and woolybutt. They must be thin, fairly straight, and of course, hollow. Trees can be found that have been hollowed up to fifteen feet long. After finding a likely tree, a didge builder peels the bark and taps the tree with his knuckles, listening for a hollow sound. Appropriate trees are felled, stripped of branches, cut into didgeridoo lengths, and carried back to camp.

The refuse of the termites' activities inside the wood are thick-walled tunnels built of saliva and sawdust. These are easily knocked out using a long pipe or length of rebar. Wood is removed from the inside if necessary to obtain the right inner diameter, with more removed from the bottom end than the end that will have a mouthpiece. The end of the didge is sanded in about a foot (toward the mouthpiece side) to

1. The Irish dord, a bronze horn over 3000 years old, may have been played in the same manner. This was discovered when Rolf Harris, of 'Tie MeKangaroo Down' fame, tried playing it like a didgeridoo. In researching this article, it has been difficult to verify information about the dord. There are no entries under that name in the standard musical instrument dictionaries — which is not surprising: there are plenty of obscure instruments that never make it into the dictionaries, and many other cases in which an instrument may appear, but listed under some other name. But an Irish band called Reconciliation has used the instrument, and their dord player, Simon O'Dwyer, has joined with Rolf Harris in putting out a CD of dord and didgeridoo called *Two Stories in One* on the Natural Symphonies label.
Some long horns from Tibet also are played in with a technique reminiscent of didgeridoo.

make a bell or cone shape with a thin wall. When the internal diameter is the desired size, the outside is sanded smooth, or planed if the wall thickness is still too great. The walls are about 3/8 of an inch thick, and slightly thinner at the bell end. The mouthpiece area is sanded down carefully till smooth, and although these didges can be played with mouth against wood, usually beeswax is applied for added comfort.

Didgeridoos vary in length from about 3½ feet to 6 feet. Ideally the mouthpiece end will have an internal diameter of about 1½ inches, and the didge will taper gently toward the bell end, which should be about 3 inches across.

Part of what makes a traditional eucalyptus didge such an interesting instrument is that each one is unique. The crooks and bends of the body and the roughness of the interior walls create sound wave patterns that vary from instrument to instrument, and are extremely difficult to reproduce in a man-made didge.

"An interesting experiment," said Stephen Kent, a well-known didgeridoo musician and teacher, "is to stand up half a cigarette paper in front of the didge, and then play. The paper will dance — it will hover about a half inch off the ground, and maybe even move an inch or two inside the didge. That shows you what the air currents are doing in a didgeridoo. They're not just moving out. In fact, if you play on a dusty surface, with the bell end in the dirt, pretty soon your lips will be covered with dust."

Tietjen and Kent talk about the way eucalyptus didges will 'play themselves', due to the creation of back pressure in the didge, requiring less breath. It appears that there is an eddying action, and that the air moving along the didge's inner walls is actually moving toward the player, much in the way water along a river's edge moves toward the source.[2]

Traditionally many didges were left unpainted, or were temporarily painted for religious ceremonies and rites of passage. But the retail market demands a pretty and colorful instrument, so now almost all didges are painted. Paints are made from found materials: white from a clay, black from charcoal or soot, browns from bark, yellow and red from colored earth. The pigment is powdered, mixed with water, and a binding agent like egg yolk, sap of orchids, or sap of gum trees is added. The binding agent nowadays is typically wood glue thinned with water. Acrylic paints are also commonly used, especially on non-Aboriginal made instruments. Sometimes Dreamtime motifs are burned into the wood.

Dreamtime paintings represent Dreamtime figures, such as Bandicoot Man, or Witchetty Grub Man. In traditional Aboriginal mythology these creatures created the world during Dreamtime by singing it into being as they walked across the earth. Afterwards, when the world was finished, they became animals, trees, or geographical formations. People who identify with the same Dreamtime creature,or Dreaming, gather for private ceremonies and rituals. The Dreamtime paintings drawn on didges for the ceremony depict Dreamtime stories sacred to that group. The paintings should not be seen by anybody who identifies with a different Dreaming. Didges made for public consumption may have paintings with totemic significance ... not the sacred paintings used during important ceremonies, but more secular ones. Even these, though, may have meanings known only to the artist and others who share his Dreaming. It is typical for the owner of an Aboriginal-built didgeridoo to know only that the Dreaming represented is of a goanna lizard, for example, and not the story the lizard is involved in. These dreamings are personal and are protected by the artists, who simply decline to speak about them in depth with outsiders.

BUILDING A DIDGERIDOO

Although the construction of a eucalyptus didge is a specialized business, a didgeridoo can easily be constructed from a number of materials. Basically, anything that is roughly 1½ to 2 inches in diameter and four feet long can be played as a didge. Vacuum cleaner hose. Cardboard mailing tubes. Squat alpine-horns. PVC or ABS tubing.

The first didge I made was out of PVC. It was a 1½ inch diameter tube, 47 inches long, which gave me a 'D' tone. Basic aerophone rules apply: Make the didge longer for a lower pitch. Maker it wider for a fuller tone with a stronger fundamental. Make the tube shorter for a higher pitch, and thinner for a brighter tone with stronger overtones.

The mouthpiece of a didgeridoo is created by shaping a wad of beeswax around the narrow end of the tube, or in the case of PVC,the end of your choice. The opening should be about an inch wide,or slightly wider. A narrower opening is easier to learn on. Some Aboriginal-made didges have a black substance instead of beeswax —.this is wax from the wild bees of Arnhem Land.

I wanted a didge that widened at the end, so I built another,out of four two-inch redwood slats, glued together narrow at the mouthpiece and wide at the bottom. I stuck on a PVC adapter — two-inch to one and a half, and put the beeswax onto that. The sound of this didge is deeper, but it is also more muddy, and quieter. I suspect the softness of redwood accounts for this. Aborigines will often keep their didges stored in fresh water, or soak them before playing, so the wood will absorb water and become more dense. The increased wall density produces a more resonant sound. I have noticed that cardboard tubes suffer from the same problem as my redwood didge — they sound underpowered.

The best of my didges was made of bamboo, which has been and still is used in making didgeridoos by Aborigines. Most music shops that sell eucalyptus didges also carry some bamboo ones as budget models.

Bamboo is available at many garden shops — it's worth looking the piles over carefully to find some that has not cracked, and also tapers slightly. Usually dried bamboo has been treated to prevent it from cracking by soaking it in linseed oil. It helps also to roast the stalks over an open flame, slowly and carefully, to prevent future cracking. The bamboo I had was cracked, so I caulked it and wrapped the whole thing with cloth tape.

The bamboo nodes need to be removed, and the remains scraped out with a wood rasp taped to a broom handle. Bamboo is hard stuff and resonates well, and looks a hell of a lot better than PVC, too. To me it sounds about the same as a PVC didge, but is more enjoyable to handle.

As it turned out, a cardboard tube I had fit perfectly over the PVC didge, and gave me a variable pitch didgeridoo — sort of a trombone didge. I think you could probably do a better job at this using a larger PVC tube and a big 'O' ring between them, for mine loses a bit of its sound in the cardboard softness and imperfect fit.

2. This is just a theory that seems to be going around — if anybody has any more information on this I would be interested in hearing from them.

PLAYING TECHNIQUE

Aborigines often play while seated, one leg bent and slightly to the side and the other more or less straight before them, the end of the didge propped up by the toes of the straighter leg. They may also play in other positions — standing, kneeling, or sitting cross-legged. The player's mouth is inserted into the didgeridoo (on the beeswax side, of course) creating an air-tight seal between mouth and didge. The wax should hit the cleft above the upper lip if you are playing straight on, or the skin above the upper lip on one side of the cleft if you are going to play out of the side of your mouth, a technique preferred by some people. It is important to keep the seal airtight, which is the main reason for thebeeswax, as pressing your face hard against the wood rim would be uncomfortable, and with the nasty toxins in PVC, possibly unhealthy.

The basic didgeridoo sound is produced by vibrating the lips, much in the same manner as a trumpet, except with looser lips,almost like a raspberry. If you push your lips out in an exaggerated pucker, and breath out, allowing them to vibrate, you'll be close to the right sound. Because the natural resonance varies from didge to didge, it may take a little time experimenting to come up with the right tightness of lips and speed of vibration. Experimenting with buzzing lips for the first time, I found it took ten or fifteen minutes to get the right sound. Suddenly,what had sounded before like somebody blowing a raspberry into a tube, sounded like a didgeridoo.

Overblowing the didge, playing it with trumpet lips, will produce a second sound, about a seventh or a ninth above the keynote.

"A really good lip can pull three to four high notes," said Tietjen, "and I once saw this great trumpet player, never played a didge before in his life, came in and picked one up and played a scale — but you have to be really good to do that. This guy had been playing trumpet for twenty years."

In his book *Didgeridoo, Ritual Origins and Playing Techniques*, Dirk Schellberg mentions a related playing technique.

One of the most striking properties of the didgeridoo is that certain frequencies with the related harmonics can be produced without any changes in the loudness of the volume or pitch. This special spectrum of sounds lies between 500 and 2500 hertz. It is produced solely by using the mouth cavity in different ways, just as for singing harmonics. At the same time the key tone of 60-80hertz simply sounds on. The higher frequencies can always be heard above this.

One factor which is very important in determining the sound is the fact that the player sings into the didgeridoo. The open throat produces a harmonic which cannot be heard in normal singing. In principle, it is possible to sing any note, because the path from the larynx to the lips or from the lips to the vibrating column of air in the pipe has virtually no return. Usually, the player sings a tenth, because this creates a powerful lower octave which is rich in harmonics. The sound produced with this interval at the moment at which the voice is suddenly added to the key note, is sometimes reminiscent of the 16[-foot] pedal register of an organ.

Other techniques used to produce changes in the bourdon include changing tension of the lips; using the tongue to affect airflow within the mouth, and vibrating lips against the inside edge of the didge — something that is more easilydone when playing out of the side of your mouth. Also, producing noises in the throat, such as singing or humming, while continuing the steady bourdon. The didgeridoo is used by Aborigines to imitate the nature sounds around them. New players, young boys usually, will be sent out into the bush alone with their didge to teach themselves. The sounds they come up with are derived from what they hear — imitations of bird calls, insects, and larger animals such as dingoes.

CIRCULAR BREATHING

Circular breathing is a technique that allows the musician to produce a bourdon, a constantly exhaled sound. Circular breathing was used in ancient Greece and Egypt, and today is still used by glass blowers and goldsmiths. The technique can be applied to any wind instrument, as many jazz musicians have done.

In circular breathing you blow air into the didge, and before your lungs are emptied you press the back of your tongue against the soft part of the palate (as you do when make the *g* sound) to shut off air from the lungs. Stephen Kent suggests thinking of circular breathing as a process of topping up: for beginners, he advises breathing in before you think you need the air, at no less than half of lung capacity. With the cheek muscles you force the air trapped in your mouth cavity out past your lips,while simultaneously taking a quick breath in through your nose. When your lungs have air again, the tongue is relaxed and air is once again breathed out from the lungs.

The difficult part of circular breathing is in maintaining a balance: using enough air from the lungs to allow a good in-breath, but not too much so you are left gasping; also keeping a steady and even amount of air passing the lips — or else you can lose the sound. You can practice circular breathing by taking a mouth full of water and forcing it out past the lips by using the cheek muscles only, while breathing in through the nose. It helps to do this over a sink. This activity helps get one get used to the sensation of two previously incompatible activities happening simultaneously.

The next step toward circular breathing is to get a hold of a drinking straw, a regular-sized one, and hold it between thumb and forefinger, constricting air flow about 50%. Take in a breath through the nose. Now, fill the mouth cavity with air from your lungs, and, using only cheek muscles, push the air out through the straw while breathing in through your nose. This is just like the previous method, except we are forcing air out of the mouth rather than water, to lower the resistance.

You can see how well your out-breath is going by using a glass of water, about half full. The idea is to blow bubbles through your constricted straw, and try to keep them going. First, try making bubbles in the water while breathing in through your nose. Again, you have to force the air out using your cheek muscles, while breathing in quickly through your nose. Use the tongue to block off the throat so none of the air that you want going out past the lips is forced into the throat or lungs. It also helps to try and fill the mouth cavity up fully, so your cheeks bulge out, which gives you a larger quantity of air to push out, hence, more time to take an in-breath. Once you get the hang of blowing bubbles while breathing in through the nose, try to connect a series of these actions. You will want to make quick in-breaths every few seconds. The whole thing, from the beginning, will work like this: big breath in, breath out from the lungs while also filling the mouth cavity, close palate, forcing air out of the mouth cavity with cheek muscles, take quick in-breath through nose, open palate and breath out from lungs again. Doing this while produc-

ing bubbles can be a lot of fun.

After gaining some mastery of this, try producing bubbles while not restricting air flow through the straw. You can also move up to a milkshake straw, which is wider and has even less resistance. It takes another little jump from there to circular breathing while playing the didge, but the whole thing can be learned in a few days, if you're diligent. The proper rhythm is individual, depending on lung capacity, and will take some experimenting.

In talking to people for this article I encountered those who believe that a PVC tube is not a real didgeridoo. Their concerns mirror those of Aboriginal builders, and they deserve to be noted.

Aboriginal builders consider the didgeridoo and the Dreamtime paintings to be their property, just as a novel is the property of its writer. Some of this is purely monetary. Didgeridoo builders make as little as $30 for instruments that retail for $250 to $450. A similar problem occurred in the 70s when Aboriginal artists began to paint and sell their Dreamtime dot paintings to white gallery owners. The gallery owners made large profits while the Aboriginal artists were given a pittance. In response to this, organizations have been created that support the artists in business matters, and help look out for copyright violations.

But the matter of copyright violations is not just about money. There is a concern that the paintings on didges (and canvas) often of important spiritual stories, will be reproduced inappropriately. Schellberg tells of a carpet factory that reproduced, dot for dot, a painting by Aboriginal artists that was produced for a museum exhibition. The painting had ritual significance, and the idea that people would be walking across it was a shock and offense to many Aborigines. This misuse of Dreamtime paintings also occurs within the Aboriginal community, inherent in the construction of large numbers of didgeridoos.

The problem is that in order to make a living selling didges they must sell items that have spiritual meaning. And when objects of spiritual significance become mass produced for the commercial market, there is a danger that they will lose their meanings, or become crass imitations of the original. The end result is damage to the culture that the Aborigines are keeping alive by making didges. Catch-22.

Building didgeridoos allows many Aborigines to live within their culture and keep a fairly traditional lifestyle while earning a western living. While the construction of a didge out of PVC pipe will not force any Aborigine to move to Sydney, it is important to know that there is a connection between Aboriginal-made didges and their cultural existence. Please keep the history and place of the didgeridoo in mind.

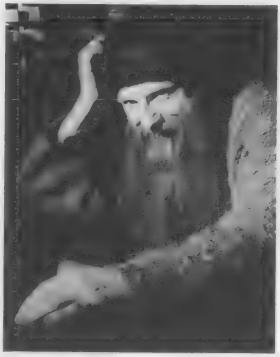
For knowledgeable and generous assistance with this article, thanks to Stephen Kent and Fred Tietjen.

A CONVERSATION WITH REX LAWSON, *PIANOLIST EXTRAORDINAIRE*

by Mitchell Clark

Rex Lawson, one of the world's foremost exponents of the *pianola* (the early, foot-operated form of the player-piano), was in San Francisco not long ago. Perhaps it would be bad luck to say he took the town by storm, as the heavy, flood-inducing rains that had plagued the Bay Area for much of the month of March, 1995, actually subsided the very afternoon Rex and his assistant Michael Boyd arrived from London. Rex was one of the participants in the second Other Minds Festival, a multi-composer new-music festival which took place during late March. His pianola performance on the final concert of the Festival was warmly received by both audience and critics.

Rex Lawson was born in London, England, on April 3, 1948, and the piano was there from the start: his parents, two talented amateur musicians, had met through playing piano duets. His education was at Dulwich College and Nottingham University, where he studied Music and French — his attempts to pursue a course of study which combined music and electronics (although common enough a thing nowadays) were thwarted by the administration of his university.



Pianolist Rex Lawson

Rex began his career in music administration and was first an orchestra manager in middle England. A long-standing fascination with player-pianos led Rex to organize for his orchestra a performance in 1972 of Edvard Grieg's *Concerto* for piano and orchestra, with Percy Grainger as the soloist. The valiant Mr. Lawson was undaunted by the fact that Grainger, at that time, had been dead for over ten years. The performance featured Rex pedaling the reproducing-piano roll of the *Concerto* which Grainger had made during his lifetime, and its success led Rex on to organizing and presenting further performances of *posthumous* pianists. His administrative career was transformed into a full-time commitment to the pianola as Ferruccio Busoni (1866-1924), George Gershwin (1898-1937), Sergei Rachmaninov (1873-1943), and others returned to concertizing via Rex's fine pedaling.

As a concertizing pianolist — "the world's only concert pianolist" — Rex's performances have included his participation in the world premiere of Stravinsky's *Les Noces* in its original 1919 version (which includes pianola, harmonium, and cimbalom), conducted in Paris by Pierre Boulez, and in the revival performance of *Ballet Méchanique* by George Antheil, at Carnegie Hall, New York City. He is also one of the few pianolists in the world who can perform as a pianola soloist in piano concerti. In London, Rex manufactures and publishes music rolls for player-pianos under his own *Perforetur* label, which he operates with Michael Boyd, and is co-founder and co-director of the Pianola Institute. Among his CD recordings of pianola music are Antheil's *Ballet Méchanique* (MusicMasters Classics 01612-67094-2) and a collection including Stravinsky's own pianola versions of *Pertrushka* and *The Rite of Spring* as well as his only work written expressly for pianola solo, the *Study for Pianola* (MusicMasters Classics 01612-67138-2).

As Rex Lawson adamantly points out, the player-piano is a serious musical instrument, invented in the late 19th century by Edwin S. Votey in New England. It was widely used in public concerts early in the 20th century, and was, throughout the Western world, a popular (although fairly expensive) domestic feature. The earliest forms were not actual pianos, but were pedal-powered devices which fit at the keyboard of a normal piano and which played the piano by means of felt-covered mechanical "fingers." "Pianola" was originally a brand name for a type of player-piano, but at present the word has come to be used in a generic sense for this kind of foot-operated player-piano mechanism. (The pianola upon which Rex performs was made in 1911, and probably by the Aeolian Company of Meriden, Connecticut.) Later, the mechanisms were built directly into pianos, and by the 1920s, player-pianos were a huge world-wide industry. Player-piano rolls of every variety of classical and popular music were produced during the early decades of the century before advances in the phonograph contributed to the player-piano's demise.

With forms of player-pianos other than pianolas, the performance is entirely automatic, controlled by a mechanical or electrical drive mechanism. But on a pianola, the player is in control of tempo and phrasing by means of a lever which controls the speed of the music roll's movement. In addition, the player controls dynamic variations by means of varying the force used in pedaling. These are the features which contribute to the pianolist being a true performing musician. A player-piano roll designed for use with a pedal-operated pianola is transcribed directly from a musical score. This differs from the situation with the (perhaps better known) *reproducing piano*, where the music roll is set in motion by an electric motor and all musical details — reflecting an actual recorded performance by a pianist — are encoded on the roll itself. Although a pianolist may pedal a recorded reproducing roll on a pianola, a roll designed for use on a pianola will be musically lifeless when played back on a reproducing piano.

The general process by which player-pianos work is probably

not unfamiliar. As the music roll — a spool of paper encoded with punched holes — is unwound, the paper passes over a brass or wooden block called a "tracker-bar." This bar is pierced with one hole per note of the piano — 65 in the earlier player-pianos and 88 in the later industry standard. When a perforation in the roll corresponds with a hole on the tracker-bar, air is then allowed to pass through that hole and down a small tube. The air activates a pneumatic valve mechanism which channels suction to a small bellows. As the bellows collapses, motion is generated which causes a mechanical "finger" to strike a piano key.

Your present reporter (who worked as the General Manager for the second Other Minds Festival) had the opportunity to observe Rex in action in a number of contexts during his stay. Rex demonstrated the pianola to the Other Minds composers, many of whom became intrigued by the idea of composing for the player-piano. He also presented three well-received pianola performances in San Francisco. Time commitments for Rex and myself prevented us from being able to sit down for an interview until the very last day Rex was in town (April 3rd, which happened to be his 47th birthday), when we were able to talk a little on pianola-related issues before he rushed off to the airport.

Mitchell Clark: Do you consider the pianola to be a musical instrument in itself, or could it be thought of as a musical "facilitator," while the actual piano is the *instrument*? For example, I'm thinking in relation to bowed-string instruments, where the bow — which is not a musical instrument *per se* — is a technology used with a stringed instrument to extend the possibilities of that instrument.

Rex Lawson: It goes with terminology, that. Inasmuch as playing the pianola includes a piano, it is a musical instrument. But I think you're right: it seems to me, yes, it is a way of playing the piano. It's different from playing it by hand, and it has advantages and disadvantages.

MC: Just as bowing a stringed instrument has its advantages, although you lose certain kinds of subtleties available on a plucked-string instrument.

RL: Yes, it's very similar, really. With the pianola you can actually play fairly simple piano music quite subtly. The more complicated it becomes, the less easy it is to play it with the degree of subtlety you might if you had two performers, say, playing with four hands. But on the other hand, I remember friend and composer David Stanhope saying that he thought the pianola treated the piano like an orchestra. It gives you that sort of orchestral sweep sometimes. Now, you can probably play a Chopin *mazurka,* for instance, on a pianola, if you really practice, almost indistinguishably from playing by hand. You obviously want it to sound like playing by hand, because that's how the piano should sound.

The pianola has its own difficulties in that you are starting out with a device which is totally mechanical and totally unmusical, whereas if you play by hand you are beginning with a human being, who does things through the hands which are quite sub-conscious. The pianola is not a good instrument to teach. It's something one has to find out for oneself: to find out why you're not sounding like a human being and to work that out in your own mind. When professional musicians are confronted by the pianola they often initially think, as someone said during this week, "well, why on earth do you have a pianola player over here when you've got all this MIDI and all the rest of it? Why bother with a pianola player? Pianolas play themselves." Then they begin to realize there's a bit more to it than that. And they probably think, "maybe it would take two or three weeks to come to grips with this instrument." Then you get somebody who does play it for two or three weeks and they think, "wow, maybe this might take a complete year." I think it's a five-, six-, seven-year process, really coming to terms with the pianola, until you are able to play it without thinking too much about it.

MC: Therefore, the pianola is so mechanical that you really have to be very focused, as the player, on the musical qualities that you give to it, and to work hard to pull it all together. Musicians that are playing "live" instruments take a certain amount of that musicality for granted.

RL: Yes. In a lot of cases, composers who have written for the pianola have had this idea of a mechanical *ethos,* Stravinsky in particular. Someone commented that the pianola performance I gave of a roll from *The Rite of Spring* sounded harsh and mechanical. Part of that, I guess, was to do with the fact that the piano was amplified, but nevertheless, Stravinsky obviously had the idea of this rather machine-like music, which I think he probably quite liked. So in that sense, you are having to submit to the *ethos* of the machine in playing mechanically, or at least in making the music sound mechanical.

Actually, there is a subtlety to that. If people listen to somebody playing and say, "that sounds mechanical," they don't necessarily mean that it sounds smooth and beautifully in time like a precise piece of clockwork. Very often what they mean is that it sounds "lumpy," and so what you are trying to avoid, with composers like Stravinsky, is it sounding lumpy. It's not an exactly regular tempo that's the problem. It's inaccuracies, unevenness in that smooth tempo which, curiously enough, people call mechanical. I suppose that is because they think of big clumsy mechanisms when they're thinking of things mechanical.

In playing the music which I very much enjoy — Romantic piano music — one obviously has to think a great deal more and bring the instrument under one's control. There's one thing I miss, though. I imagine playing by hand must be an almost sensual thing for pianists. I guess things like rubato and the spreading of chords must have a very tactile response to them, which obviously you miss to a degree with the pianola. But on the other hand there are lots of things you can do in the range of notes you can play. The pianola's simply part of the spectrum of musical instruments.

MC: Playing the piano itself is an activity that involves the whole body. But to put it crudely for a moment: a pianist is expected to supply fingers and interpretation, whereas for the pianolist, interpretation still includes such things as dynamics, phrasing, and tempo changes, but the fingers are taken care of — so to speak. Now, your own pianola playing is very tasteful musicianship, but is there a danger for pianolists to go all out in the area of interpretation, and exaggerate phrasing and dynamics as if they feel they need to justify the absence of finger virtuosity?

RL: Very good question. Yes. I, in playing Romantic music, probably sound a bit over the top to present-day ears, but that's simply because I'm used mainly to listening to earlier recordings on reproducing-piano rolls and 78s. And I happen to think that piano playing is rather anemic these days, so I like playing like that. But one may find pianolists, not particularly good, who are constantly playing around with the tempo lever, clearly overdoing things.

For example, there is player-piano music by Italian composers, written around 1920 — what they called futurist music. The Germans had a similar sort of thing, which they called "music devoid of soul." Paul Hindemith wrote such a piece, but the way he had the roll cut, he did extend the first beats of bars in a number of cases, so it wouldn't sound completely machine-like. So, getting back to answering this question, it's quite clear, in my own mind, that the Italian composers such as Casella and Malipiero wrote music that was to be played pretty much straight. Now that isn't to say that you play it *totally* machine-like, because a machine would be completely boring. But they wanted to avoid romantic interpretation as suits Romantic music but didn't suit their music. It's important when you are a pianola player to respect that sort of thing.

It's possible that I personally have a tendency to play loudly sometimes. On that subject, it's very difficult to find pianos that will play quietly with the pianola. I really love to make the notes just whisper, which is quite difficult.

MC: Now, concerning the "player-piano" in general, the "pedaling" style of playing, as in what we now call pianola, preceded the reproducing piano. But by the late 1920s, the reproducing piano had really superseded pedaling.

Rex Lawson (left) at the pianola with player piano composer Conlon Nancarrow.

RL: The reproducing piano was developed in 1904, and the first one came out in 1905, actually. The change of emphasis you're speaking of was different in different countries. In Britain, pedaling pianolas was very popular. The Duo-Art was the main reproducing piano system made by the Aeolian Company, though in England they had pedal-electric Duo-Arts, which meant you could have it automatic, playing reproducing rolls, or you could pedal ordinary rolls on it. The pedal-electric Duo-Art had complicated rotary switches to switch to different types of roll.

MC: So, much of the history of the pianola as a pedaling instrument is an English history?

RL: Yes, I think it is. Writing for pianola, that' s another matter. George Antheil wrote for pianola. His autobiography glosses over everything, but there is a book by Bravig Imbs called *Confessions of Another Young Man,* which talks about Antheil. Bravig Imbs was a journalist in Paris in the '20s and is very clear about how the *Ballet Méchanique* took place. He describes the first play-through of the rolls, which was privately done in Paris at the Pleyel Company. James Joyce, Ezra Pound, Bravig Imbs, and various others — about a half-a-dozen people — were there. The rolls had more or less come straight off the perforating machine. There was a young lady, presumably about twenty or something, who brought the rolls *breathless* from the perforating room, and sat down to pedal them. Imbs said that as she played her complexion reddened, and that she was obviously pretty much out of breath by the end of it. Well, I get a bit out of breath myself, but the fact that they had a young lady who did not appear to be an experienced pianola player in charge of playing *Ballet Méchanique* back to the composer's representatives implies to me that the tradition of pedaling the pianola was not taken as seriously as it was in England, where there were concert pianolists who did concertos with symphony orchestras. I know, for example, that Easthope Martin, who pedaled the pianola in the Grieg piano concerto in 1912 with the London Symphony Orchestra, often made trips abroad to the continent of Europe to give concerts. Why did he bother to do that? Presumably because there were not many pianola players on the continent.

MC: The histories of the player-piano and of the phonograph seem somewhat related, in that each device ended up as a medium of *reproducing* music, whereas the original intentions were different.

RL: I think capitalism has a lot to do with that. I tend to see things slightly politically. Capitalism rather insists that people should be consumers. I mean, I always notice that with music in England there's this huge amount of funds available for children at school to play in orchestras because that's their education and it's a *good thing* to educate the young. But when they leave college, it' s very much more difficult to remain a member of an amateur orchestra. There are far fewer amateur orchestras, and all the money goes towards encouraging people to go to public concerts, which are much more commercial things. It's as if you should be playing only if you are a professional.

One thing you have to remember with reproducing pianos is that early on they were *stunning* to listen to. If you listen to a reproducing piano today (if it's working properly—there are maybe two or three in the world that are) it's still very impressive. But in 1905 or 1910, if you think how the phonographs or gramophones were still very primitive, then reproducing pianos must have blown people's minds—I mean, quite fabulous things.

MC: And also for a listener to know that they were hearing a Paderewski or a Rachmaninov...

RL: Yes, the implication to everybody in those days was that that was what they were hearing. If you look back on it, you can see how much the editors had to do to edit the rolls to make them sound right. A friend of mine used to say that reproducing pianos produced "portraits," rather than "photographs," of a person playing. Phonographs produced very much a "photograph."

MC: The player piano, certainly I guess by the end of World War II, had essentially died out as anything other than a novelty.

RL: Yes, I suppose so.

MC: But was there any continuation in England after that period?

RL: *Just...* Pedaling, I think at least to some degree, is kept going through me, but not just me. Don Wilson, who plays jazz rolls in England — he's in his mid-sixties and he's kept it going. Denis Hall, another friend, also, though Denis and I have come to it really in the 1970s. I used to know an eighty-or-so-year-old

pianola player called Bill Candy, who was a music-roll reviewer for the *Musical Times* in England. He gave me his entire collection of music rolls which he had mainly free through being a reviewer, with the idea that one day the rolls would end up as a collection of the Pianola Institute, which we founded. He pedaled, not that I heard him that much; I heard a recording of him. And there was another chap who opened my eyes to the fact that you could play the pianola as a musical instrument. So I realized from other people that you could do it, but there was no training of any sort. I'm self-taught, I guess.

MC: In its heyday, was there training in England — did pianolists teach pianolists?

RL: A little bit. Reginald Reynolds, who was the chief pianola player in the '20s, taught Edward VIII, for example — Prince of Wales, as he was — to play the pianola. But I don't know that it was a very long course of lessons or anything. And actually, it meant a lot to Reynolds, playing the pianola. I think he used to play a bit fast, really. It's a psychological thing, but if you play fast on a pianola it doesn't sound believable, because it's a pianola, and people say, "oh, no, nobody can play that fast." But if they hear Horowitz play that fast they say, "oh, isn't he wonderful!"

MC: Do you have any speculations as to where the pianola might have gone musically if its place had not been eclipsed by advances in recording? Did it seem destined for greater things?

RL: It's very difficult to tell, really. In England, I always think that the pianola would have kept going as a foot-operated instrument quite well. But because the American parent company had to liquidate its assets in order to buy their main competitor, the American Piano Company, they therefore virtually shut down most of the rest of the world. It might well be, had they been prepared to accept a slightly smaller profit over a longer period of time and they had kept the foot-operated player-piano going, that at least it would have lasted and transferred these days into the electronic era. It seems to me the player-piano has a good future with electronics. I think it will survive because music is so passive these days, on the whole, and it doesn't seem to me that that's very healthy. As a performer it's very nice to be standing up there and playing, but it would be awfully nice to feel that more people were discovering the joys of the pianola at home.

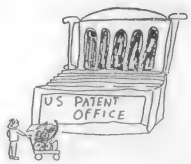
Rex Lawson's writings on the pianola are regularly featured in *The Pianola Journal* (the journal of the Pianola Institute, 111a Station Road, West Wickham, Kent, England). In addition, he contributed an essay on Stravinsky and the pianola to Jann Pasler, ed., *Confronting Stravinsky: Man, Musician, and Modernist* (Berkeley: University of California, 1986).

This interview may also be found at Other Minds' site on the World Wide Web, where it appears in a slightly different edited form. The Other Minds address is http://www.otherminds.org.

HISTORICAL MUSICAL INSTRUMENT PATENTS

Four Patents Relating to String Instruments

by Cary Clements



I'm going to talk about four U.S. Patents for musical instruments. Two of them are for inventions that were, and still are, very big sellers. And the other two — well, were it not for their place in the Patent Library, would probably never be heard from again.

Why would an inventor apply for a patent? Without the protection a patent offers the inventor has little or no recourse should others decide to copy his or her invention. From an economic point of view then, it makes sense to receive a patent for an invention that has a chance of becoming a popular item.

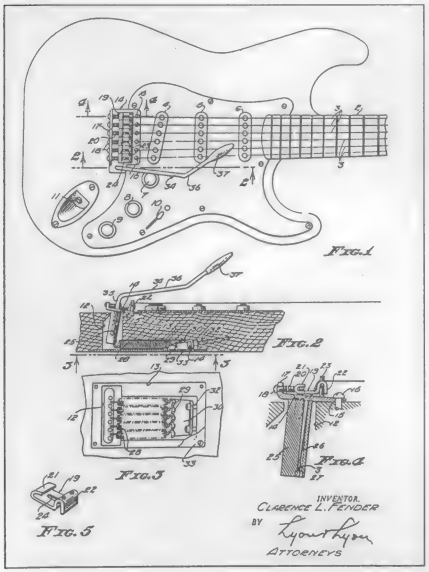
A byproduct of this process to protect the inventor is the historical record that it leaves behind. Over 5 million patents have been issued in the United States in the past two hundred years for every kind of invention. Most of these are easily available on microfilm in major population centers. And every major industrial country has its own patent system, so there are literally millions of patents out there waiting to be sifted through. If I had to guess at what percentage of these were musical instrument related I would say maybe 1 to 2 per cent.

The information on a patent offers a glimpse into the lifestyle of the times when the patent was issued in. The patent documents give the name and the city of residence of the inventor, as well as the date the patent was applied for and the date it was granted. They also show drawings, the quality of which vary from patent to patent. Some are extremely crude renderings and others are literally works of art.

One of the most successful musical instrument patents ever granted was for Leo Fender's Stratocaster guitar tremolo (US Patent No. 2,741,146 issued April 10th, 1956). This is a highly copied design for a musical instrument, and when it came out it was a breakthrough in tremolo design. But from the 50s through the 70s only Fender could make and sell this design because of the patent protection. I'm including it in this article because it's something a lot of readers will be familiar with.

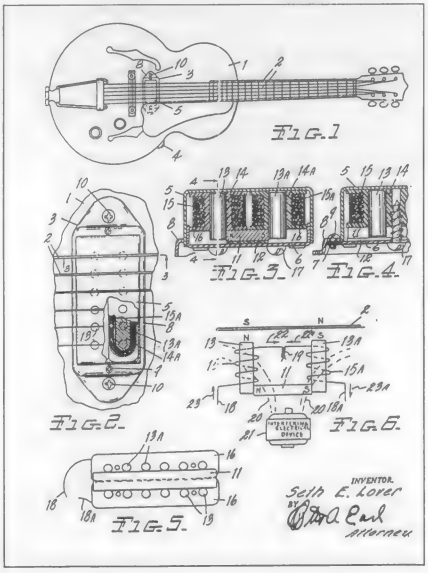
Another is the humbucker pickup designed by Seth Lover (US Patent No. 2,896,491 issued July 28, 1959). Nowadays there are many companies that make this style of pickup, but like the Fender bridge it was protected from being copied for 17 years from the date of issue of the patent.

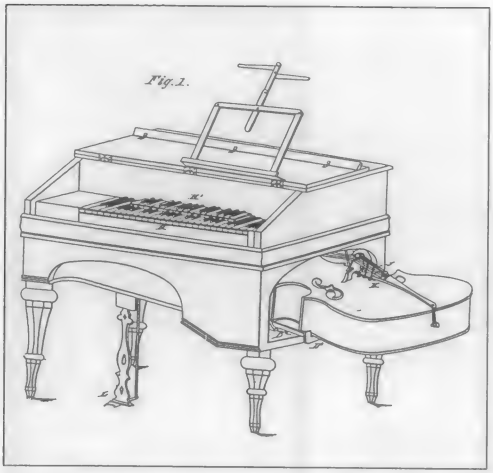
Both of these patents were issued for an invention that not only

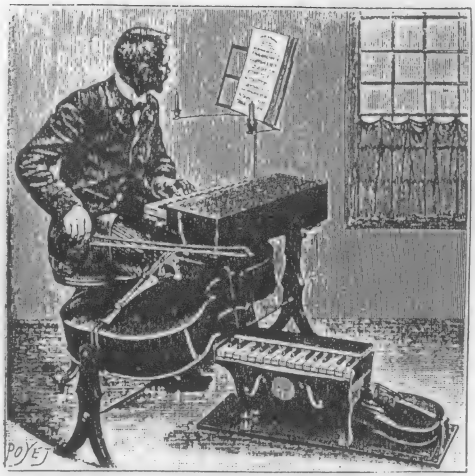


Left: Drawings from Leo Fender's patent for the tremolo bar, U.S. Patent #2,741,146, 1954.

Right: Drawings from Seth Lover's patent for the humbucking pickup, U.S. Patent #2,896,491, 1959.







Above: Drawing from Hans L. Deden's patent for a keyed 'cello, U.S. Patent #179,530, 1876. Above right: A depiction of Mr. de Vlaminick's virtually identical 1893 invention (reproduced in *Victorian Inventions* by Leonard de Vries in collaboration with Ilonka van Amstel (American Heritage Press, 1971).

had a practical function, but also filled a need in the real world. It was possible for them to be made and marketed because the inventors had the means to do so, and also because there was a demand for them.

Half the fun of collecting patents is reading them. The language used is a most curious blend of the legal, logical and scientific. It's really a language of its own and could be rightly called "patentese". In studying a patent, you hold the drawing in one hand and the text in the other and refer back and forth between them to figure out how the invention works. Try reading this paragraph from the Fender patent and finding the named parts in the drawing (on the left on the facing page):

The bar 25 is relatively massive, preferably formed of solid material, and the tension springs 28 are preferably quite stiff, so that unless the control arm 34 is manually oscillated there is no tendency for the bar 25 or springs 28 to vibrate when the strings are plucked. The mass of bar 25 and stiffness of springs 28 may, however, be maintained at a minimum because of the relatively close coupling of the bridge portions 22 and the fulcrum ridge 15. With this arrangement the entire bridge structure normally acts as a rigid member. Thus, no tremolo effect occurs except at the will and direction of the player.

A great idea whose time has come is only as good as the ability of the person with the idea to actually carry it out. So getting a patent is like taking out an insurance policy. It guarantees you some protection in case your invention becomes a marketable thing. As mentioned in the previous article in this series, most inventions that are patented go nowhere. Most seem to just wither and die.

At least that's the impression you get when you start to go through the patents in the library.

Now we'll look at two patents that were issued almost a century apart but have a few things in common. Both of these inventions are for mechanically played instruments. And both would be forgotten were it not for someone like myself digging through rolls of microfilm and stumbling upon them while looking for something else.

U.S. Patent No. 179,530 was issued to Hans L. Deden of Charleston, South Carolina on July 4, 1876. Mr. Deden's invention was entitled "Improvement in Keyed Violins, Cellos, etc." The basic idea of this invention was to place the top half of a 'cello inside a case containing a mechanism that enabled the strings to be stopped at the proper places to produce all of the notes in the instrument's range when the proper keys were depressed.

The lower half of the 'cello protrudes from the right side of the case. The strings were bowed with the right hand and the keys were played with the left. Hans had high hopes for his invention:

In view of these important advantages of my invention it will be seen that I have cleared away the obstacles that heretofore impeded the increase of popularity of the violoncello, and have opened to lovers of music that sphere of executions heretofore known only to very few amateurs, and not very many professional musicians.

How well this invention was received is hard to tell without more research. I have come across a drawing in a book of basically the same invention but credited to another inventor, a Mr. de Vlaminck (*Victorian Inventions* by Leonard de Vries in collaboration with Ilonka van Amstel, American Heritage Press, 1971). The year is given as 1893, seventeen years after the Deden patent was issued and the year it expired. I am speculating here, but maybe Mr. de Vlaminck waited 17 years for Mr. Deden's patent to expire and then tried to make and market it himself, which would have been perfectly legal.

U.S. Patent No. 3,443,468 issued May 13th, 1969 to Raymond A Kidwell of Frederick, OK is entitled "Mechanical Fingering and Picking Device for Electric Bass Guitar." This

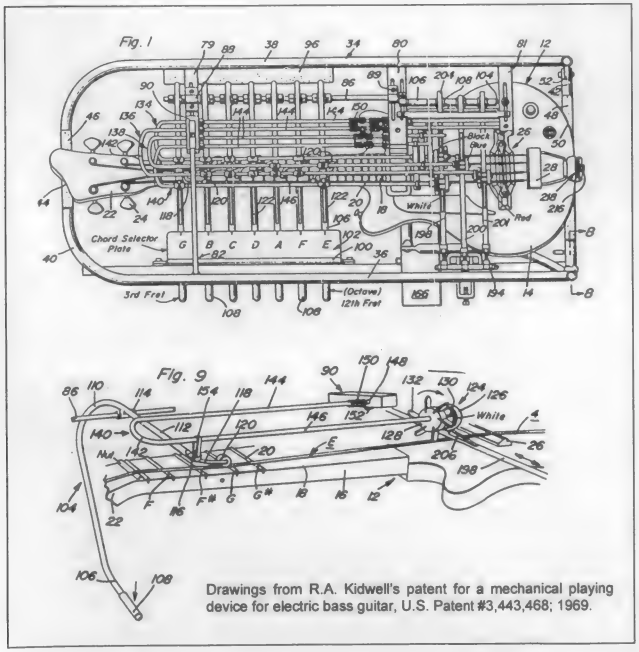
device is a stand that holds a standard solid-body electric bass. It, like the keyed 'cello, has mechanical fingers that stop the strings at each note. A mechanical paddle wheel strikes the strings near the bridge in rhythm to make them vibrate. All of the controls on this machine are operated with the feet, leaving the hands free to play another instrument. In the text of the patent Mr. Kidwell said about his invention:

Not only is the invention uniquely attractive in appearance, the performer, if qualified, can, when endowed with showmanship and dexterity of feet and mannerisms, put on a spectacular show, can offer a "one-man band" act by playing a second guitar with his hands, can sing or, alternatively can add to his versatility by also playing a harness-held mouth organ or the like. Then, too, since a single guitarist can double up on two guitars (one treble and the other an accompaniment rhythm bass) the bass man normally required in a small group can be dispensed with.

These last two inventions are both very clever designs that, while not lacking merit, remain virtually unheard of. Why this happened is probably very apparent in hindsight. But at the time of their invention they could have both been the next big thing.

Suppose one-man bands had become all the rage in the late 1960s, and thousands of "Mechanical Fingering and Picking Devices for Electric Bass" had been manufactured. Today they might be worth thousands of dollars as sought-after collector items, or be sitting unused in garages everywhere as a reminder of a passing fad.

Or what if orchestras all over the world a hundred years ago had adapted the keyed 'cello as a standard and rejected the upright 'cello. Things would certainly look different in symphony halls today. While it's fun to speculate about how things turn out and what could have been, the fact remains that these latter two patents, unlike the Fender and Gibson patents, are now just interesting inventions that reside along with thousands of others in the records of the United States Patent and Trademark Office. In the future we'll look at more of these gems.



Drawings from R.A. Kidwell's patent for a mechanical playing device for electric bass guitar, U.S. Patent #3,443,468; 1969.

The articles that follow are the first two in a series of four articles on making unconventional musical instruments for sale. The first is from *EMI*'s editor Bart Hopkin, who has scarcely ever sold a musical instrument in his life. In his non-expertise, he does his best to take in an overview of the topic, and to set the stage for the real experts that follow. The second is from Richard Cooke, maker of *Freenotes* percussion (over 1200 sold!), along with beautiful one-of-a-kind instruments made on commission. To continue the series, in the coming issue we will have an article from Dave Strohauer of *Earthshaking Percussion*, which operates a retail store and mail-order catalog full of irresistible new and unusual instruments created both in-house and by other makers. Finally, also in the coming issue will be an article from Tim Anderson and Janet Powell, founders of *Fascinating Rhythm*, creators of innovative percussion instruments focusing on the educational market in New Zealand.

MAKING MARKETABLE MUSICAL INSTRUMENTS

By Bart Hopkin

Is it possible to make money through designing, making and selling unconventional musical instruments?

What does it take to make a commercial success out of a non-standard musical instrument?

I have never set out to turn a profit at making and selling instruments of a sort that might appear in *EMI*. But I must confess that I've often speculated as to what such an undertaking would be like, and asked myself the questions above. I find myself thinking, "Gosh, there are a million great instrument making ideas just waiting to be taken advantage of! Wouldn't it be fun to try to come up with some instrument designs that could be affordably produced, and profitably sold?"

These thoughts soon give way to moments of colder appraisal. I begin to wonder if a commercial enterprise of this sort wouldn't be a lot more work than it appears. The suspicion takes hold that most of that work would not be in the pleasure of designing and crafting, but rather the drudgery of promotion and clerical matters. And I also suspect that financial rewards would almost surely elude me. This last consideration — the financial rewards bit — is a serious matter in my case, since my track record suggests that I'm not exactly a marketing wizard.

Yet during those heady moments just before the coldly analytical moments I have done a lot of daydreaming. I have even filled a few pages with hand-written notes on the subject of marketability.

It occurred to me some time ago that this is a topic worth pursuing in the pages of *EMI*. And it occurred to me that a fun way to approach it might be for me to organize my thoroughly untested thoughts on paper, and pass them around to a few people whose thoughts on the subject *are* tested — people who have made a go of it with commercial production of non-standard musical instruments. Then my original writing could be presented in *EMI* along with responses and further thoughts from my more experienced correspondents.

And that is what I have done. The results follow here. I hope this blend of my own non-expert speculation and the more knowledgeable commentary of others will have some value for all the musical instrument designer/maker/dreamers who have considered making a plunge into a commercial market.

I can see two fairly distinct approaches to the making and selling of unconventional instruments: that of the artist and that of the manufacturer. The distinction I'm making has nothing to do with artistic merit; it's purely a matter of market strategy. To take an artist's approach is to think in terms of making unique individual pieces, often using labor-intensive methods. Artists produce in relatively small numbers, and sell at relatively high prices to galleries or directly to individuals. Manufacturers, on the other hand, think in terms of producing larger numbers of identical or near-identical items and keeping the cost per unit low. They are more likely to sell through wholesalers or a wider range of retailers. While an artist's marketing approach will play at least some role for almost all non-standard instrument makers, this article will be oriented primarily toward the prospects for a manufacturer's approach.

COMMERCIAL VIABILITY

Let me proceed by suggesting a number of factors relating to the question "What makes a musical instrument design commercially viable?" If you think you have a potentially marketable musical instrument design in mind, take a moment to assess where it stands relative to these considerations.

Good Sound

...Obviously.

Cost

Equally obvious. If the instrument under consideration can be manufactured quickly and inexpensively without sacrificing quality, that's a great plus. I will talk more about retail price and cost of manufacture later in this article.

Sturdiness, Stability, Safety

Sturdiness, stability and safety are important for commercial viability. If the instrument design under consideration for production has moving parts that require fine adjustment, and if they tend to get out of adjustment, that's a drawback. If the instrument requires extensive assembly or adjustment by the purchaser, that's a drawback. If it is fragile, that's a drawback. If it's finicky in a way that makes quality control difficult, that's a drawback. If it

has sharp protrusions or other elements that could lead to injury, that's a drawback. If it's made of materials that don't age well, that's a drawback. If there are potential problems with toxicity, fungal growth or unsanitary oral contact, that's a drawback.

Portability

An instrument that stores easily, can be packaged easily, and ships inexpensively has a great advantage. If the instrument is big and/or awkwardly shaped, that's a drawback.

Appearance

Musical instruments often have an innate beauty of form. Does the proposed design bring this out? It may be an advantage for a design to resemble existing instruments at least enough to elicit a "*music*!" response from those who see it. In other instances, the rule may be "the wackier the better." In any case, a finished look is desirable; a half-baked look is another drawback.

Non-replicability

"Just like homemade!" sells cake mixes (to continue the baking metaphor), but it may detract from the commercial value of your instrument. There should be something that suggests to a potential buyer that you, the manufacturer, are uniquely capable of making this product. You can achieve this quality by any of several means: 1) Use of to special tools, knowledge of special manufacturing techniques, or possession of special skills or experience; 2) Use of special materials not widely available; 3) Trade secrets (information known only to you, without which the instrument can't be made as well).

A partial exception to both this and the previous consideration: For some craftsy items, a hand-made look, rather than a sophisticated manufactured look, may be desirable.

Demonstrable Sound Value

If the classical violin had never existed, and if instead it were to be invented fully formed tomorrow, it would be a tough sell. There would be no pool of trained players to demonstrate its worth; there would be no existing repertoire; people would not have in their mind's ears the idealized violin sound that we as a culture have developed over a period of centuries. There would just be the inventor scraping away, producing the unpleasant sounds that beginning violinists always produce, and saying "It's got potential, *trust* me!"

By way of contrast, a new or unusual instrument that can demonstrate its worth here and now has an important advantage. Demonstrable sound quality can be achieved in several ways.

1) If an instrument is so easy to play at the initial stages that it reveals the beauty of its sound even to someone who has never touched it before, the battle is won.

2) Some otherwise non-standard instrument designs borrow their playing technique from existing instrument types, allowing them to draw upon an existing pool of skilled players. The most obvious example here — and the most commercially successful — is the spate of new electronic instruments using piano keyboard interfaces. But the same idea can apply to playing techniques borrowed, with varying degrees of fidelity, from anything, guitar to flute.

3) Some sound instruments are self-demonstrating, because they are self-playing. Examples include wind chimes, door bells and door harps, rain drums, aeolian harps, aeolian pipes, teapot whistles, clockworks, and various sorts of mechanical instruments.

Functionality and conceptual hooks

One way to sell products is to make them useful in the most practical sorts of ways. How about designing aesthetic sound devices having useful functions in other aspects of daily life? To the above-mentioned door bells and teapot whistles we can add dinner gongs, school bells and other signaling devices, instruments designed for diverse pedagogic purposes, and ... um ... fun house sound effects, and ... um ... um ... maybe you can think of more.

Practical considerations aside, buyers may be attracted to a particular product because something about it has a special place in their world view. For instance, instruments using certain sorts of natural materials may have a special appeal, if they are made in a way that highlights and shows respect for those natural origins. Instruments which somehow speak to particular cultural associations may enjoy a similar appeal (but be careful — there is the potential for a sense of cultural rip-off if one takes this marketing approach without a good dose of humility and respect). Similarly, outdoor instruments, children's instruments, instruments associated with meditative practice, all may claim a special place in people's lives.

Good Design, Fine Artisanship, Ethical Marketing & Production Methods, Gorgeous Sound

These are the qualities, implicit in all of the preceding discussion, that matter most.

MORE ON COSTS AND PRICING

Costs of instrument manufacture include materials costs, labor costs (your time at a decent wage), marketing or promotional costs, and a number of additional, easily-overlooked expenses that can be clumped together as overhead. You need to be able to sell the instrument at a price that will cover these costs and more. If you are selling directly to customers, then what they pay is what you get, less taxes, but if you sell to wholesalers or retailers then you must take into account that the sale price will at least double before it gets to the customer. All this is obvious, but I have a sneaky feeling that it would be easy, in the excitement of new entrepreneurship, to be unrealistic with oneself about how these cost/price questions play out in a harsh economic world. Are you sure that it's realistic to expect to sell the item in question at prices high enough and in quantities large enough to cover all the costs of producing it, *and* come away with some return on all your effort?

Consumers today have benefited greatly at the cash register from the efficiencies of mass production and distribution (skewed though those efficiencies may sometimes be — but that's another story). In that environment, it's easy for people to underestimate the cost and value of hand-made goods, or goods made in small quantities. The small-scale producer naturally wants to get a price which fairly reflects the costs, risks, time and creativity that go into the product. But that price is likely to look way out of line to anyone who has recently been shopping at K-Mart ... or at any one of those massive discount warehouse stores full of merchandise assembled in huge quantities at minuscule wages in a third world country without child labor laws or environmental safe-

guards.

In an earlier draft of this article I tried to set out my highly speculative guesses as to what price ranges translate into what sorts of sales to what sorts of buyers. It turned out to be a rather silly exercise and I abandoned it. Instead I'll just repeat the obvious: Even if you are convinced of the attractiveness and saleability of your product, it is a great challenge for small-scale makers to produce high-quality instruments at prices that look attractive to buyers in the current economic climate. It is important to be realistic about what sorts of instrument designs have that level of attractiveness and saleability, and at the same time have the potential for efficient, low-cost manufacture. Good luck.

With all that said, we should once again give a nod here to the opposite marketing approach. If you can convince people that your item is a work of fine art or craft, rather than a standard manufactured item, you may be able to charge higher prices commensurate with your artisanly work. People have been known to pay hideous prices for an esteemed violin (the inexplicable "Stradivarius effect"). They are less likely to do so for an untried sound-making device, but in the fine art market, stranger things have happened. If you take this approach, your potential market will be much smaller. And it will be restricted to a wealthy clientele. Maybe this un-democratizing of your work bothers you; maybe it does not.

APPROACHES TO MARKETING

Now here's where I really don't know what I'm talking about, having never done this sort of marketing myself. But since the stated purpose of this article is merely to open the door to the topic, I'll proceed with at least a few very brief thoughts.

You can aim to sell your product directly to customers, or you can sell through wholesalers and retailers, or you can do some of both.

If you want to sell direct, you need figure out who are the sorts of people who might buy the product, and then figure out how to let them know the product exists. But they — potential buyers of non-standard musical instruments — are an odd and elusive demographic group. There are mass mailing firms from which you can purchase mailing lists of public libraries, people with incomes over $200,000, pest-control professionals, and who knows what else, all of them thousands of names long. But none of those firms has ever compiled a list of people who like weird instruments.

For esoteric products, marketing efforts tend to be costly and not always effective. Mass mailings are expensive and considered criminal by people already inundated with junk mail. Ads in suitable periodicals vary widely in cost, and their effectiveness also varies widely. Here's a bright spot: I have found that in the area of free media exposure, we in the weird instruments business are at an advantage. Our products make interesting copy and produce intriguing photographic images. As a result, editors like us. So you can often do well in getting articles about your product to appear in magazines and the like. Getting people to perform publicly on your instruments is also a natural way to draw attention. On the other hand, if one of your instrument's strengths is its uniqueness, then an association with known performers may actually have a slightly negative effect. Finally, if you have a good product, patience is a great virtue. It's true what they say about word of mouth, but it takes time.

If you intend to work through wholesalers or retailers, be imaginative as to whom you try to sell through. Traditional music stores may not be your best bet. But there are a number of music stores specializing in unusual items. Consider also: galleries, crafts outlets, gift stores. For certain kinds of items, think of garden centers, toy stores, houseware stores. Many small-scale makers have worked through flea markets, crafts shows, and street fairs. Especially important in this area, think of mail order outlets. There are a number of catalogs available which offer unusual instruments.

You might also consider (I've often heard this idea floated) banding together with other makers to create a co-op. Pool your marketing costs and efforts, and produce a catalog of your own. Then, of course, you once again face the challenge of reaching that odd and elusive demographic group of unconventional instrument buyers.

FEW MORE CONSIDERATIONS

Here's a question: Would it be best to come up with just one great, eminently marketable musical instrument design, and stick with it? Or better to develop an entire line of instruments for sale. (My personal answer: I have no idea which would be better commercially, but it would be a lot more fun to have a whole bunch of ideas to play around with.)

Another question: Do you, as maker/business operator, prefer to perform most of your operation hands-on and in-house (or in-garage), or would you rather create the designs, and then contract with an outside fabricator to do most of the actual manufacturing?

And a final observation: I used to raise quail. Maybe I will again sometime — I enjoyed having a dozen or so fresh eggs for breakfast each morning. I bought my quail-rearing equipment from a company that specialized in quail-related items. The owner of this company was very proud of his commercial success, and the catalogs he put out were full of up-by-the-bootstraps descriptions of how his company had grown to become a big enterprise. What was noteworthy about this guy's self-publicized success was that he didn't make his way by raising quail, selling smoked quail, marketing pickled quail eggs, etc. ... He made it by selling quail-raising equipment to other people — hobbyists, enthusiasts, and would-be entrepreneurs who thought they could make money by producing those things. Whether any of those other people ever made any money, I don't know.

The world of unusual instruments is a bit like that. Just as the number of people who want to start quail enterprises themselves may exceed the number of those who want to buy a jar of pickled quail eggs at the store, the number of people who enjoy experimenting with their own instrument ideas may be greater than those who want to buy and learn to play someone else's idea. For that reason, it might make as much sense, from a commercial point of view, to facilitate other people's explorations as to try to sell them a completed product. At least, there's room for such an approach.

THE HISTORICAL PERSPECTIVE

by Richard Cooke

I began instrument making from the artist's perspective. I wanted to make instruments that could serve unusual purposes for me and the folks I wanted to play with. At that time I was playing with Paul Winter in the Winter Consort. For two years Paul and I worked together on the project to turn his Connecticut farm into a music camp. With that end in mind I envisioned a forest full of instruments for people to play as they walked around. First I built a xylophone footbridge — actually an idea of Paul's, but his earlier version had rotted away. Next came a set of large chimes hanging from a tree. Then my first original design, a wood and aluminum marimba in a grove of beech trees, followed by other instruments including a piece I called the organ pipe volcano.

The music camp was a success and a dream come true for both Paul and me. I learned that some of the major difficulties of standard instruments for beginners are the chromatic scale and muscular coordination related to producing a good tone and a good *series* of tones. So I made further designs to facilitate improvising for persons who hadn't yet got their feet wet. Paul's advice was toward percussion instruments because of the relative ease of producing sound. Even a baby can hold a stick and strike something. But being a flute player, I was hooked on melody and harmony, so for me the solution was pitched percussion. Using Jon Scoville and Reinhold Banek's book *Sound Designs* [10 Speed Press, Berkeley, CA, 1984; revised edition 1995], I made a foray into using tuned resonators of PVC. The results amazed me and I knew there was a vast potential, commercial and educational, for this sound-making system.

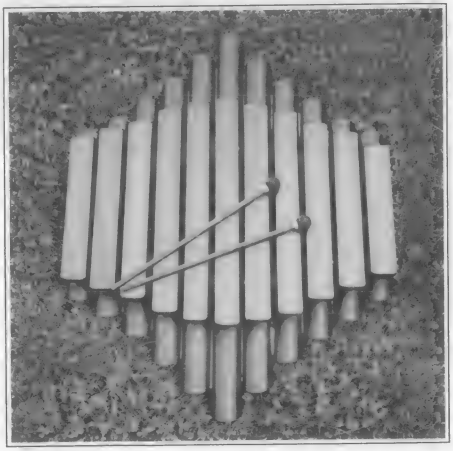
I also deliberately made the instruments non-linear or non-scalor, meaning the pitches were not in ascending order bass to treble, but placed in an unpredictable pattern on the instrument. This was so that expert and beginner would be on equal footing and so the music would be surprising. Later I realized that this allowed for a bypass of the analytical-rational part of the intellectual thought process and allowed a more initiative approach, which I have found very useful in enhancing creativity among beginning musicians.

TRIAL, ERROR AND EMERGENCE

The economics were quite difficult though. First I tried the artist's approach, selling xylophone footbridges and wood and metal custom marimbas to wealthy clients. I learned craft techniques and to make my instruments uniquely beautiful or odd. But I could sense this would not satisfy long term. What I really wanted was to provide a wide range of normal folks an access into the amazing turn-on and creative stimulus that music playing has been for me. A mass-produced approach was essential for this.

It was one of my wealthy clients who directed me to the solution. They really didn't have room in their house for the wood and metal marimba I had sold them and were worried it was

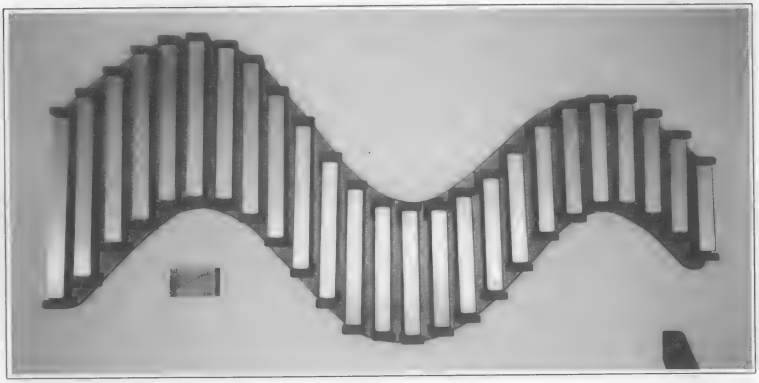
Richard Cooke's *Freenotes*, set in a non-linear geometric arrangement.



The Imbarimba, Richard's newest production instrument.

moldering away out in the yard. I'd designed it to stay outdoors so I know it'd be OK, so I repurchased it over the phone sight unseen, resold it again over the phone, sight also unseen.

This situation brought into focus the need for rethinking of the basic design. I mulled the problem of how to create an instrument that would fit into my client's thickly furnished home. A wall-mounted piece seemed a natural solution. In response to that design requirement, I swiveled the resonators to become parallel to the bars rather than perpendicular. I found that I could create an individual resonator-and-bar combination oriented horizontally, in such a way that the resonators could then serve as the base for the bars as well — *so voilá,* each note became separate, *free*!, from the other notes. *Freenotes* were born! Had I known then that tonebars (used in schools and by piano tuners) also used parallel resonators and that at least one major manufacturer had an inexpensive design utilizing them I would have abandoned the thought of making this idea an enterprise. But ignorance was an aid, and by the time I discovered that my idea was not so new I had already gone a good ways toward making a business of it.



Soundwave in C: A wall-mounted *Freenotes* set.

PERSISTENCE FURTHERS

The first couple of years were thin, but I kept on, largely from not knowing what else I could do that would mean as much to me or allow me to contribute as much to other people as I felt I could by building instruments that would introduce them to the musician slumbering like a genie in a bottle within them. Now its been four and a half years and I've made and sold over one thousand sets of freenotes. Four months of the year I build custom instruments of my design for sound healers, composers, wealthy people and performing musicians. I just received my first municipal commission, for a xylophone footbridge in a local park.

The economics are still a challenge and a mystery but bills get paid and I don't have to resort to other avenues of getting funds to do so. I'm happy with my work, though mass production (even on a small scale) entails numbing amounts of repetition. The clerical work is a drag and running my own business is not all honey and pie. But I feel I am being drawn into the area where my own talents and skills can find their most widely beneficial expression and thereby allow me to feel my actions as significant. Also I meet interesting people engaged in exploring sound and its effects and uses. On my worst, most doubt-ridden days I would wish to be doing nothing else for a living, so I reckon I'll do this until I've accomplished my original goal.

THE BASIC INGREDIENTS

For me, a passion for music-making has been necessary, primarily because this business is pretty thin soup financially at times, and the satisfaction of playing my instruments with other people has often been the main reward for manufacturing them.

Another necessity has been a feeling of mission in this work. It may seem crazy, but I am convinced that widespread music-making could "save the world" by enhancing human creativity and respect for beauty, nature and cooperation. Music is the language of the heart and soul, and if we all were fluent there would be far less violence, greed and anger in this world. I'm over simplifying here, but this conviction has fueled my work when business is slow.

Also necessary is a love of challenge, because business is not art, and it is an uphill climb for an artist. The potential rewards of having one's own business are great — freedom, money, recognition and such — but it takes a lot of hard and lonely work to get near them. And buying and selling can be soul-numbing. It can really hurt when people reject or are indifferent to your work. A thick skin, discipline, keeping decent records and an ability to take the long view are essential.

MARKETING

Knowing your potential customers is vital. Mine are primarily non-musicians. Basically, I want everyone to experience the pure joy of playing music with other people, so I build instruments to make it easy for non-musicians to get off the sidelines easily. I sell mainly in craft galleries in tourist towns. That marketplace has dictated some of the design aesthetics of my instruments. Mainly I sell wholesale, so volume is important. As Bart says in his opening essay, people decide to purchase for a number of reasons: tone, playability, similarity to common instruments, artistic value of appearance and versatility. The main things are tone and ease of playing, I believe. Hence my choice of mallets, pentatonic scale, long sustain and precise resonation for all my production designs. All designs are related to xylophones which gives quick acceptance, but have enough uniqueness to delight the purchaser's quest for items of distinction.

PRICING AND PRODUCTION

Next, the challenges of price-point and production methods. And this is, or has been for me, a trial and error process and one of the more interesting challenges of the business.

Efficiency of production is essential and a real spur to crea-

tivity. The design must be conducive to efficiency, production steps need to flow in an orderly and effective manner, and tooling needs to be both precise and simple.

I try to do about 2/3 of my work in semi-mass produced items for retail sale in craft galleries and 1/3 custom pieces. The custom pieces usually serve as research tools — what's custom this year may be mass-production in a couple years.

Research is a necessity, both into materials and processes and in acoustics. *Better sound cheaper* means more potential customers, and for me, more customers means more people affected by the heightened creativity music-making stimulates. My instruments are designed to help people be creative easily, and I firmly believe that if all Americans were aided in being more creative they'd have less need for the consumer crap the commercial production of which makes our culture such an environmental nightmare. I'm done with my soapbox for the moment.

SUMMARY

Now, its a *long* way to Tipperary, I'll grant you, so I won't worry at present whether my ultimate goals are attainable. I'm starting with the instruments. They and their tones are the active ingredients — the creative catalysts. The tones *must* be pleasing, delightful. The designs *must* reach out and invite playing. As flowers lure insects so Freenotes lure persons interested in music-making sonically, visually and tactically. But I'm not just luring their money, I'm trying to get them to join the great global band!!

The foregoing is all pretty general and probably not too useful to anyone considering going into this as a livelihood. The main thing I'd advise is to use cheaply purchasable materials that need a minimum of processing to look good and create good sound. Non-musicians generally will stop at about $200.00, maybe $300.00, for an instrument unless they are wealthy. That's how I figured when setting any target price point anyway. In the last 4-5 years I've sold about 1200 sets of Freenotes at approximately $100.00 per set wholesale. It's a living, but I wouldn't do it for the money. Satisfaction and creativity are primary rewards thus far. However, I think there's a fortune to be made with the right designs and a genuine contribution to quality of life as well. It's a good business for me.

Believing that music-making has had a powerful effect on his life and self-understanding, Richard Cooke seeks to make that effect available to as many people as possible by creating instruments that avoid the largest difficulties beginning musicians usually encounter. His instruments do not require a developed ear or trained muscles, and all the out-of-key notes have been taken out; they use only diatonic or pentatonic scales, so all notes are in harmony. Richard now lives in Moab, Utah , where he continues to build instruments for everybody. He is interested in considering cooperative marketing with other instrument makers and in design of outdoor installations of instruments in municipal playground and park settings. You can contact him at PO Box 1492, Moab, UT 84532; phone (801) 259-4411.

THE REEDED MOUTH BOW

By Wayland Harman

Wayland Harman has been working to develop a mouthbow in which the harmonics that carry the melody are louder, more sustaining and more prominent than they are in other mouthbows, as compared to the drone. In the following article he reports on his progress, as well as providing some background on mouthbows in general.

My fascination with mouth-controlled instruments is rooted in my association with the founders and participants of the North American Jew's Harp Festival. I was re-introduced to the Jew's harp about four years ago, not long before the first NAJH Festival. (I'd had one as a kid and never really knew what to do with it.) A wide variety of mouth instruments were demonstrated at this festival, including the mouth bow.

All of these instruments share a wonderful feature; the use of the human mouth to control pitch. The complex task of controlling pitch through mouth resonance is accomplished easily due to the extensive training these "speech" muscles have already received. This ability to vary the size of an instrument's resonance chamber, precisely and with instantaneous feedback, is unique to mouth-controlled instruments. If you have never tried playing anything like this, you are in for a treat as you experience using your head as a musical instrument and hearing the notes from the inside.

The mouth bow is one of the oldest stringed instruments known to humankind. It is as simple as a stringed instrument can be, and can produce hauntingly pure harmonic sounds. Essentially, it is very easy to play; however, producing strong harmonics takes practice.

The mouth bow is played by placing one end lightly touching the lips and in front of the mouth, while holding the other end in a position that allows picking the string, much as a silver flute is held. When the string is picked, its sound is resonated through the wooden body of the bow. The part of the bow in front of the mouth sends sound into the mouth where individual harmonics can be made audible by matching their frequency with the resonance frequency of the mouth cavity, by controlling the mouth cavity size and shape. This is where those well trained speech muscles come in to play.

Note that only the sound emanating from a small portion of the instrument is utilized. Moreover, the bulk of the sound produced is competing with the small bit with which the player has to work. This drone sound masks some of the most beautiful harmonics ever produced. In the mouthbow design that I have been developing, my goal is to reduce the string's drone sound while boosting the mouth's volume.

To accomplish this, I have started with the assumption that if you cannot put the sound into your mouth, you cannot alter its quality. I have reduced the overall sound level of the instrument by making its dimensions heavier and less resonant. I have increased its mouth-directed sound level by making a certain area more resonant. This is accomplished by utilizing a thin reed connected directly to the string. This reed visibly vibrates and produces a good hum, louder than any other area of the instrument.

The five instruments I have constructed lead me to the following conclusions:

1. Some advantages have been realized with the new design, most notably, increased sustain and increased volume of harmonics.

2. Matching the pitch of the string to the reed is very beneficial, especially in the higher harmonics.

3. The thinner the reed, the better — to a point.

4. Blowing across the reed, as with a Jew's harp, does not add volume or sustain. It may be that if the tolerances between the reed and the surrounding frame were sufficiently tight, a sustaining effect would be produced.

5. All five instruments still have a relatively loud drone sound. The string itself is loud enough to interfere with the desired harmonics.

6. The increase in harmonics sound levels does make recording the harmonics easier.

DIAGRAMS

A general note on diagrams 1 through 4:

As drawn, these diagrams show only the ends of the instruments which are held to the mouth. The top view is shown from the string side which, in play, faces the audience. The side view is shown as a cross section through the center of the top view. Cross hatched areas are where such a slice would penetrate the wood. Non-cross-hatched areas indicate a viewable surface set back from this imaginary cut line.

The instrument bodies are straight boards except #1, which is slightly bent. The tuning devices are attached at the end not diagrammed, which also has a variety of carved ornamentation. The string parallels the body, more or less. Bridges can be inserted and moved as desired. A wide variety of set ups and styles of play can be tried.

My goal has been to make significant improvements at the business end of the instrument that will allow me to hear what really happens when alternate set ups are used. I have tried many variations and prefer the longer string lengths for overall harmonic content.

The areas marked "mouth position" are where the mouth receives the sound energy and may be much wider than the mouth. Different places in the "zones" have different harmonic content, requiring some movement during play to achieve the widest possible note range.

#1. Diagram 1 shows my first mouth bow. Overall length 35", string length 30", reed length 2", constructed from a single piece of alder ¼" thick and 2¼" wide. None of these dimensions were arrived at in any careful manner; they just looked right. The reed was cut from the body with a coping saw, then drilled to accommodate the string. The string enters the near end of the reed, turns 90 degrees at the pin, exits the wood and is held in place by the bail end. I am currently using a plain steel .015" diameter guitar string. The tuning mechanism is a walnut tuning peg.

A channel had to be carved near the reed end of the bow to allow the string room to enter the reed and vibrate freely. The point where the string first meets the reed must be made tight with a splinter of wood forced into the hole. Without this step, the instrument has a very bad buzz.

#2. Changes include heavy body to reduce resonance, a longer reed and longer string length. Results: The longer reed plays different harmonic frequencies better or worse depending on the location of the mouth along the reed length. Higher tones are more available near pivot and lower tones toward the middle of reed length.

#3. Changes include a disc at reed end and new string configuration. Also added two bridges, splitting the string approximately 1/3 - 2/3. Results: this is the best of the 5, with the longest sustain per pluck of the string; up to 7 seconds. The weight of the disc at the far end of the reed has moved mouth placement for the higher harmonics toward the center of the reed and left some very strong low tones at the disc end. The two bridges allow a finger to press the string down to raise the drone pitch and the resultant harmonic series. The interaction of the two string lengths has a limited but positive effect on the play. The exact bridge placements were done by trial and error — determining what sounded best when played.

#4. Changes include a short reed with a connecting arm that is driven by the string. This is another new design for the string configuration where string tension is held against a block rather than a pivot rod. The reed area does not provide enough harmonic diversity, although one harmonic can be made to sound quite clearly. Unfortunately, this was an interesting looking and unsuccessful design.

#5. Not pictured. Changes include using a piece of pipe extending over the length of the string, with the string inside. My goal here was to further reduce drone volume by enclosing the string itself and allowing the sound to leak out at only the end. The execution of this idea revealed that the pipe still radiated a significant amount of drone sound and the reed assembly is very tricky to set up. Further exploration is merited.

I believe that significant improvements have been made. With a microphone, the harmonics can be made to stand out well above the drone. The sustain on these instruments is approximately twice that of traditional non-reeded mouth bows. A wider range of notes is available and adjusting the mass of the reed would seem to be a way of making the instrument particularly suited to a certain key.

Bow #4 REBORN

Preparing this article has encouraged me to continue experimenting. As a result, and somewhat by accident, since the preceding was written I have produced an instrument which satisfies my original goal where the harmonics play louder than the drone sound. Bow #4 now plays at least a twelve-note harmonic series, with three of the lowest sounding louder than the string's drone. These harmonics are sustainable for a period of 7 to 10 seconds.

This drastic change, from least successful to most successful, is due to a change in the manner of play coupled with physical adaptations. Rather than playing the original reed, I have flipped the bow over and play the connecting arm. This places a section of the string inside the mouth, with a vibrating wood support on which to rest the lips so they do not mute the string. Fortunately this arm, now functioning as the reed, is a removable part and easily re-manufactured.

The reed I am now using weights about 1/10th as much as the original connecting arm it replaces, and is thin enough, in places, to see light through it. It forms a reflective trough behind the string, cradling it with only enough clearance to prevent buzzing. This part must support (as a compressive load) the full tension of the string, and is thus limited in its minimum dimensions (thinness). I have not broken one yet; however, I am getting close.

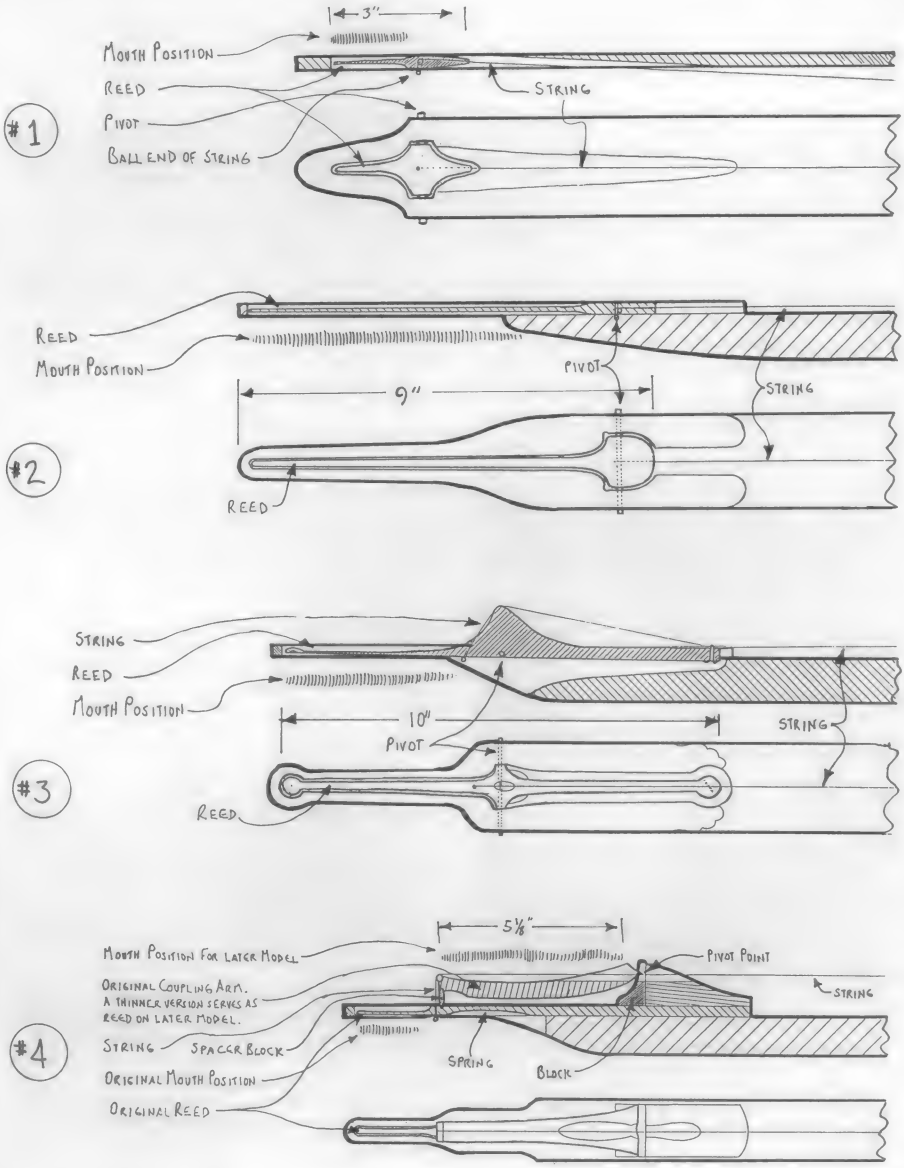
An interesting note on the surface texture of the reed: smooth surfaces generate less sound than a strongly textured surface, such as the tiny craters of a small gouge. I have sanded the rough surfaces out to make a reed lighter and suffered diminished volume. Now I sand to thinness from the backside.

I did not go into the mechanics of this design in my previous discussion of bow #4. It hardly seemed worth it considering how poorly it performed. Now that this is my best bow, I will try to explain, in words, what should best be left to seeing and touching.

Imagine trying to balance a pencil, point down, on table. It will fall every time, unless supported. If you tape two pencils of equal length together and try to balance them standing on the table they still fall, but only in two possible directions, eliminating many variables with which with a support system would otherwise have to contend. Now, if you could be sure that no outside force would ever push the pencils beyond say 1° out of plumb (straight up), then the support need not be very strong. The pencils never get far enough tilted over to pull against the support more than the tiniest little bit. A spider's silk could hold up those pencils if placed perpendicular to the line of the pencil points. And, if that silk was a spring, it could be a very weak one indeed.

In this example, the pencils are supported by the table against an opposite force of gravity. In the bow, the reed is supported by the block and body against the opposite force of string tension. Across the face of this block is a groove into which set two wedge-shaped points at the reed's end. This arrangement keeps the reed's "pencil points" from sliding out from under, and across the "table top". It also reduces potential movement direction to a single plane. Imagine if our pencils were made out of play dough, they would collapse and fold under the tension placed upon them by gravity. I would prefer this not happen to my reed; however, by making the reed as thin as possible I am pushing the envelope.

Now, as to guaranteeing that the pencils stay straight up, which on the bow is to have the string pass exactly between the two support points. In this design, the end of the reed away from the block is connected to a flexible section in the wood that supports it, functioning as a spring. The string turns 90° at this end of the reed and its tension holds the spacer block. The key here is the wooden spring. All of the string tension is transferred through the reed to the block. The spring has only to limit the reed


#1
3"
MOUTH POSITION
REED
PIVOT
BALL END OF STRING
STRING
#2
REED
MOUTH POSITION
PIVOT
9"
STRING
REED
#3
STRING
REED
MOUTH POSITION
10"
PIVOT
STRING
REED
#4
5⅛"
MOUTH POSITION FOR LATER MODEL
ORIGINAL COUPLING ARM. A THINNER VERSION SERVES AS REED ON LATER MODEL.
STRING
SPACER BLOCK
ORIGINAL MOUTH POSITION
ORIGINAL REED
PIVOT POINT
STRING
SPRING
BLOCK

A BRIEF HISTORY OF THE MOUTH BOW

A mouth bow is simply a bent stick with a string stretched on it, held during play so that the mouth can be used as a resonance chamber, and sounded by percussion, plucking or other means.

The only clear difference between mouth bows and other forms of musical bow, such as the Brazilian Berimbau, is that with mouth bows the mouth is used to amplify and alter the string's drone sound. By altering the size and shape of the vocal cavity, the player can bring out different harmonics, producing a melody in harmonics over the steady drone of the string's fundamental. Some design features to accommodate the use of the mouth may be built in; however, there are many different kinds of mouthbows, and no hard and fast rules can be applied. Practiced mouthbow players can sound the 2nd through 14th harmonics and possibly higher. A variety of design modifications have been used in an attempt to make the harmonics louder, as they are hard for anyone (including the player) to hear.

Mouth bows can be found in many cultures, presumably developed independently of each other. Variations in design, style of play and cultural use define a wide array of individually named instruments. The simplicity of the instrument lends itself to re-invention many time over, and building instruments from what is on hand has undoubtedly created its own spectrum of variations. Adding religious expression and ritual use further expands the variation in design and use of mouth bows.

It is fairly easy to imagine an archer fiddling around with his bow and discovering he could amplify its sound by using his mouth placed at one end. I propose that is equally as likely that an ancient musician, temporarily tired of playing music, could have discovered that his bow could launch, with some force, the stick he used to tap the string. It is probable that both of these scenarios are true and possibly others.

As very little information is available regarding the origins of individual instruments, I am left to work backwards from examples of traditional instruments. When the subtleties of design variations are removed, most bows can still be viewed as a stick with a string stretched upon it.

The following categories represent many of the variations in mouth bow instrument design and play.

1. Holding the instrument
   a. either horizontally or vertically
   b. resting with instrument body to lips
   c. resting with an attached resonance chamber to lips and mouth, as with the *Ekitulenge* of the Konjo people (Uganda)
   d. passing string between parted lips
   e. placing a part of the instrument with strong vibration to mouth, such as the open end of a hollow tube part as with the *Isithontolo* of the Zulu people
2. Producing drone sound
   a. plucked — often with finger or pick
   b. struck — usually with a stick or rattle
   c. bowed — with a bow or stick
   d. scraped — by rubbing over notches in side of instrument body as with *Xizami* of the Tsonga people (South Eastern Africa)
   e. blown — by blowing over a "quill" — a flat piece inserted between the end of the string and the stick as with the *Lesiba* of the Southern Sotho people (South Africa) or the *Gora* (South Africa)
3. Altering drone sound
   a. changing size of mouth when used as resonance chamber
   b. opening and closing gap between lips and instrument body, altering the opening size as with a Helmholtz resonator
   c. opening throat to varying degrees
   d. moving tongue to produce very small space directly behind front teeth
   e. stretching the string or making it more slack by bending body of instrument
   f. stopping or muting the string with the finger or a hard tool like a movable fret
   g. shortening the string length with fixed fretting
4. String configurations
   a. single length held firmly at ends
   b. single length with tuning mechanism
   c. string divided either by use of a bridge or a loop pulling the string towards instrument body, thus dividing it into two or more segments, as with the *Setolotolo* of the North Eastern Sotho people (South Africa)
   d. variations in string diameter and tension
   e. Soft bridging at harmonic nodes
   f. multiple strings in a variety of the above configurations

While this information does not encompass much of the mouth bow's history, I hope it will allow experimenters to choose from a wide array of design variations in their own creations. If you have never known the thrill of playing a mouth-resonated instrument, I hope you will take the time to produce a simple mouth bow and experience this ancient music. There is something very special about hearing your song from the inside out.

movement to our 1° tolerance while allowing free vibration within this range of movement. At its thinnest, the wood in this spring measures 1/16" x 1/2" wide. Finger pressure on the reed will easily move the free end 1/16". This is much further than it moves in actual play. Since the spring component in this design is not a replaceable part, I am waiting until I make a new model to see just how thin this can be.

I believe the success of the instrument is due largely to the ability of the reed to move. It "floats" on the wooden spring and is, therefore, able to vibrate much more freely than a fixed connection point. I am now redesigning to allow both ends to "float" and to place the string on the front of the instrument rather than the backwards arrangement currently employed. This will make for a more comfortable play.

The success with this design encourages me to try variations in bridging and plucking now that the results are quite audible. I believe the full potential of the mouth bow is yet to be realized.

This series of acoustic experiments has been very rewarding. *EMI* has played an important part by supplying understanding and insight into the creation of sound. Thank you all who have helped fill *EMI* with your great ideas and for allowing me to use them as lenses through which the views of my own inventiveness can be shaded.

Wayland Harman's interests run a wide gamut from music and woodworking to games, nature and the search for the meaning of life. He serves as master of ceremonies at the North American Jews Harp Annual Festival and holds a patent for a musical instrument he calls the Clackamore (a percussive Jews Harp). His work on experimental instruments dates back four years and must, out of necessity, take a back seat to his day job as a furniture medic. For more information or to offer insight, please contact Wayland Harman at PO Box 6444, Boise, ID or call and/or fax him at (208) 338-1577 MST evenings.

VIDEO REVIEW

By Warren Burt

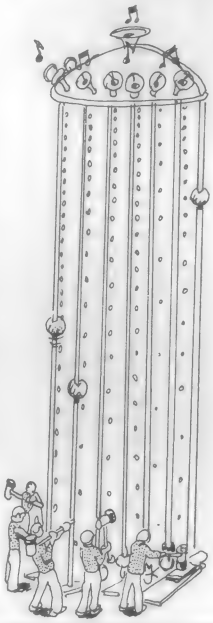
ENCLOSURE I: HARRY PARTCH

Four Films by Madeline Tourtelot with music by Harry Partch

On video (VHS) (NTSC – American Standard), Innova Video #400, from Innova Recordings, Minnesota Composers Forum, 332 Minnesota St. #E-145, Saint Paul, MN 55101

This is the first of three releases from Minnesota's Innova label featuring material by and about Harry Partch. The second, also now available, is a four-CD set of early Partch recordings, lectures and compositions; the third, to be available next year, is a collection of Partch letters, drawings, and writings. These releases are absolutely invaluable in that they allow access to Partch at all stages of his career, with a wide range of materials that allow us to gain a fuller picture of him than is available simply from his book *Genesis of a Music* and the extant records and CDs.

For readers of *EMI*, this release will be an absolute treat. Between 1958 and 1961, Harry Partch collaborated with filmmaker Madeline Tourtelot to produce four films. *Rotate the Body in All Its Planes* uses the University of Illinois gymnastics team as its subject matter. The music is largely drawn from Partch's music for his drama, *Revelation in the Courthouse Park*, which also featured the same team of gymnasts. *Music Studio – Harry Partch* will probably be the favorite film in this collection for *EMI* readers. Here we see Partch demonstrating his instruments, assembling the multitrack soundtrack to Tourtelot's "Windsong." What is most inspiring about this film is watching Partch play. His rhythmic accuracy and his vibrancy do more to explain his concept of corporeality than any words could. Also notable in this film are the little touches — glimpses of Partch's 1958 Chicago apartment, watching him pack and mail records, etc. These are sure to establish a more than mystical continuity with Partch's way of working for many of the *EMI* community. Also notable is the ease with which Partch handles technology in the film, laying down track after track on a primitive four-track machine. The myth of Partch the technophobe won't survive a viewing of this film.



U.S. Highball, one of Partch's most interesting and funny pieces from the 40s, has long been unavailable. The film version, with the instrumentalists filmed in 1958, and the railway scenes filmed in 1968, is also in this collection. Studio shots of the musicians singing, playing and intoning alternate with shots of desert landscapes, trains, and Tourtelot's signature birds in flight. The bird was a potent symbol for her. The final shot of Chicago poignantly encapsulates the disappointment Partch felt on reaching his goal. These first three films have the feeling of both visual and sonic collaboration between Tourtelot and Partch. *Windsong* seems more Tourtelot's film than Partch's, though the film is inconceivable without Harry's soundtrack. It's a highly symbolic retelling of the Greek myth of Daphne and Apollo, and though it may not be to everyone's taste, it shows an extremely interesting experimental filmmaker at her best, and reveals something of the marriage of image and sound that she and Partch were trying to achieve. In short, if you have any interest in Harry Partch's work,(or in Madeline Tourtelot's, for those interested in 1950s experimental film) you should get this video.

SOUNDCULTURE 96:

An Exhibition of Experimental Instruments at the Falkirk Cultural Center

By Mitchell Clark

An instrument exhibition featuring works by Oliver Di Cicco, Fran Holland, Tom Nunn, and Peter Whitehead.

Curated by Cameron Cartiere at the Falkirk Cultural Center, in conjunction with SoundCulture 96. The Falkirk Cultural Center is located at 1408 Mission Avenue at E Street, San Rafael; CA; telephone 415/485-3327

April 2-20 — Exhibition
April 2, 5:30-7:30pm — Opening, with performances by the artists
April 13, 10am-1pm — Experimental instrument workshop with Fran Holland

The exhibition and the opening are free; the workshop is $3 for children and $5 for adults

I once heard it said that Henry Cowell, an important doyen of experimental music in the early twentieth century, did not consider the design and development of new musical instruments to be an important contribution to the development of new music. Cowell himself played a critically important role in experimental music in America by looking towards the musics outside of Western Europe and by developing new instrumental playing techniques. However, the great flurry of activity in instrument concept and design during the later twentieth century has shown that there are indeed ways, from Harry Partch onwards, in which new instruments go hand in hand with new music.

As part of SoundCulture 96, works of four of the Bay Area's experimental instrument builders will come together for an exhibition at the Falkirk Cultural Center in San Rafael.

Tom Nunn's instruments have been seen in the pages of *Experimental Musical Instruments* since the journal's first volume. Many of his instruments are of a type he has called *electroacoustic percussion boards* (EPB). These works are often complex combinations of plucked, rubbed, scraped, and struck materials of various kinds. Most of Tom's electroacoustic percussion boards—for example, the early *Mothra* and *Earwarg* — have unusual zoomorphic shapes, and all EPB are built into tables, reminding one of the table-top instruments of Howard W. Mitchell (active during the 1960s) such as the *d'orcimer* and the *double psaltery*.

Tom Nunn's involvement in instrument building began when, as a graduate student at UC San Diego, he gave up writing composed musical works and turned to improvisation using found objects. From this use of found objects the interest in building his own instruments developed. Tom is concerned with the aesthetics of improvisation using instruments of one's own design and construction, believing that improvisation and the building of experimental musical instruments go hand in hand, and that "particularly in the case of improvising with experimental musical instruments: the instrument plays the player as much as the player plays the instrument." (See his article in *EMI* 8/1.)

To this exhibit, Fran Holland will be contributing a participant-interactive installation. These installations are an area which he has been developing for many years. His complex structures interact by means of a logic based on the structures' parts, and, being open in form, allow for participants to explore "the instrument" for themselves. Each time he puts such a structure together, it is different, determined by materials and contexts. He has said that the Falkirk piece "will probably include gutters, self-switching gates, various resonant objects, alarm bells, and basketball hoops." Through the structure, balls — "the main unit of interaction" — set things in motion. If one were to say that his sounding structures are something like a "Rube Goldberg-ian, non-competitive pinball machine, played by many people" it would be a comparison which Fran would enjoy.

Fran also leads workshops, teaching how to build instruments out of salvage and recycled materials. On Saturday, April 13, he will present such a workshop in conjunction with this exhibition.

Peter Whitehead's instruments utilize unusual approaches to common materials, creating sounding objects which are poetic in conception and execution. His instruments optimize the acoustic features inherent in his sounding materials, and his solutions to problems of resonance and sound projection are elegant in their simplicity and effectiveness. An example would be his use of inflated balloons as support for a long metal bar in *The Single Bar*, contributing to unencumbered vibration and extended sustain time for the sounding bar itself.

Oliver Di Cicco is a San Francisco sound engineer as well as an instrument builder and improvising musician. His instruments often bear family resemblances to existing instruments but are quite original, incorporating unique features. His *Duo Capi* is a wind instrument, making use of saxophone mouthpieces, to be played by two instrumentalists. In *Duo Capi* each player affects the other's flow of air and therefore the character of his or her playing. His five-foot tall *Percussion Tree* is a visually elegant structure made of amplified vertical steel rods, bent into angled shapes or supporting vibrating metal disks.

There will be a variety of opportunities to hear these instruments in the context of the Falkirk exhibition. The Tuesday, April 2, opening will feature performances by the artists. In addition, recordings of instruments of each of these makers will be available for audition at the exhibition. And as mentioned above, Fran Holland's piece will be interactive and on-going for the duration of the exhibition.

For more on these instrument makers, see the following profusely illustrated articles which have appeared in *EMI*:

Tom Nunn, "Meet Mothra" 1/3 (October 1985): 8-9

Tom Nunn, "Holy Crustacean, Batman, That Beast Sings" 1/4 (December 1985): 8-9

Tom Nunn, "'Bugbelly'— A T-Rodimba EPB" 6/1 (June 1990): 1, 14-16

Peter Whitehead, "Cans and Springs and Bars and Plates and Wheels" 7/2 (September 1991): 10-11

Peter Whitehead, "Mobius Operandi: Instruments by Oliver Di Cicco" 8/1 (September 1992): 3-7

Tom Nunn, "Improvisation with Experimental Musical Instruments" 8/1 (September 1992): 13-15

Various *From the Pages of Experimental Musical Instruments* cassettes include recordings of instruments by Tom Nunn (volume 6), Peter Whitehead (volume 7), and Oliver Di Cicco (volume 8).

SoundCulture 96 is the third transpacific festival of contemporary sound practices, to be presented in the San Francisco Bay Area from April 3-13, 1996, and bringing together local and international sound practitioners who reside in the Pacific Region to explore the diversity of culture that is perceived through our ears. SoundCulture 96 follows the two previous SoundCultures, presented in Sydney in 1991 and Tokyo in 1993. SoundCulture 96 participants are artists, researchers, cultural theorists, presenting organizations, academic institutions, and others working with sound. Events will include performances, exhibitions, symposia, radio transmissions, experimental and indigenous musics, site-specific public artworks, and new media arts, as well as listening rooms which will provide an opportunity to hear a wide variety of recorded sound works in informal settings. For further information on SoundCulture 96: telephone, 510/848-0124 ext. 623; fax, 510.430.3314; e-mail, *sc96@kumr.lns.com;* or World Wide Web, *http://www.lns.com/sc96.html.*

SoundCulture 96's day-long series of events in Marin County (sponsored by Falkirk Cultural Center, Public Art Works, The Headlands Center for the Arts, The Marin Arts Council, and the SoundCulture Host Committee) will be on April 6, and begins at Falkirk Cultural Center with an outdoor performance by Kazue Mizushima. Call for schedule information. During April, Falkirk will also be presenting site-specific gallery installations by Dan Senn and Krystyna Bobrowski (inside the center), and Landa Townsend (in the greenhouse). Check the SoundCulture Web page (address above) for information.

BOOKS

BOOK REVIEWS

By Bart Hopkin

ZACH M. ARNOLD: **MUSICAL PUNSTRUMENTS: A GUIDE TO THE CONSTRUCTION, USE, AND RHETORICAL ANALYSIS OF 62 NOVEL MUSICAL INSTRUMENTS BASED ON MUSICAL PUNS**

Published in 1994 by The Boxwood Press, 183 Ocean View Blvd., Pacific Grove, CA 93950. xvi + 287 pages; spiral bound.

"Jello, Dali" is the name that author Zach Arnold gives to a playable musical construction whose visible form consists of an empty Jell-o box adorned with imagery from Salvatore Dali's painting *The Persistence of Memory*, including the famous melting clocks. With this odd-looking device you can actually play a simplified version of the melody of "Hello Dolly." It's easy to picture a good-humored performer standing before a small audience, playing the tune, and then inviting the people to guess the name of the instrument. Given a whole set of these miniature instruments, each embodying a different visual-musical pun, you could make quite an evening's entertainment — maybe even better than my old favorite TV show, "Name that Tune!"

This is what Zach Arnold's book *Musical Punstruments"* is about. It presents 67 of these punstruments, from Oh, Holey Knight (A.K.A. Awl Through the Knight) to the inevitable Musical Chair. Each miniature instrument in some way illustrates a musical pun and each is capable of playing a suitable melody-cue for the pun. The book includes complete instructions for constructing the individual punstruments, along with more general information on punstrument-crafting tools and techniques.

At this point *EMI* readers will be asking, "if these are really playable instruments as advertised, how do they work?" It's hard to imagine how the author could have created such a number of miniature instruments meeting the visual and conceptual requirements of his punsmanship, making them at the same time fully tuned and operable for musical purposes, *and* described them all adequately in a book of moderate length. The answer to this imponderable turns out to be, from an instrument experimenter's perspective, disappointingly simple: in all but a couple of the punstruments the musical playability comes about through a small store-bought diatonic harmonica, discretely inserted somewhere within the sculptural display that illustrates the pun. The artisanship, it turns out, is not in instrument design; it is in the making of an effective display.

The intent of this book, you see, is to delight the punster; only secondarily is it about musical instruments. Before, after and throughout the descriptions of the 67 punstruments, the author engages in extensive discussions of the pun-crafter's art. Much of chapter 6, "Rhetorical Background", is a discussion of the morphology of puns. Most of the glossary is devoted to arcane terminology relating to wordplay. In all this, Arnold's writing is crawling with internal puns of its own. Yet he adheres to a professorially dry and academic tone — playfully so, perhaps, but dry and academic it is nonetheless.

Musical Punstruments is liberally illustrated with clear and readable line drawings. There are no photos — too bad; it would have been fun to see some of the punstruments as they actually appear. The production has a home-made quality, with 300 dpi printing and a few corrections noted in the text by hand. The book is highly recommended for punsters with an academic bent, as well as those of us who still can't understand why they took "Name That Tune!" off the air.

CARY KARP, ED.: **THE CONSERVATION AND TECHNOLOGY OF MUSICAL INSTRUMENTS**

Published in 1992 by the Getty Conservation Institute (4503 Glencoe Ave., Marina del Rey, CA 90292, USA) This book is presented as a supplement to Volume 28 of the semiannual *Art and Archaeology Technical Abstracts*, although it is bound and sold separately.

The Conservation and Technology of Musical Instruments is a bibliographic resource intended for museum curators and others concerned with conservation and restoration of musical instruments. The bulk of the book consists of abstracts of just under a thousand articles, monographs, books, dissertations and audiovisual materials touching on those topics. Included are writings from around the world, written in diverse languages. The abstracts are concise (typically not more than about 150 words), and they are clearly and informatively written. They won't serve as stand-ins for the original materials, but they will let you decide whether the original article is worth seeking out for your purposes. At the end are several appendixes, including an author index, a source directory (addresses of publishers), and, most important, a subject index. Look up any topic of interest here, and you'll get a pretty good idea of how much there is written on it, which of those writings are worth reading in full, and where to get them.

RECORDINGS REVIEWS

By Sasha Bogdanowitsch, Warren Burt, Mitchell Clark, and René van Peer

ARNOLD DREYBLATT AND THE ORCHESTRA OF EXCITED STRINGS: **ANIMAL MAGNETISM**

On CD from Tzadik TZ 7004. 61 East Eighth Street 126, New York, NY 10003

Animal Magnetism is the latest album of Arnold Dreyblatt's work with instruments playing in a just intonation scale derived from overtone series. Central in his music are string instruments that are struck rather than bowed — a practice one also finds in the music of small Hungarian communities in one particular valley in the Carpathians in Rumania and in the Basque Country. This lent his previous album, *Propellers in Love* (on Hat Hut Records, hat ART CD 6011), a predominantly frisky and folky sound. On *Animal Magnetism* he has extended the range of the music. Drums, bass violin and electric bass as well as brass and saxes make the overall sound heavier. Repetitive strains and drones are still part of the music, but have been relegated to the background. Most of the melodic material on *Propellers* condensed from overtone clusters. Now Dreyblatt has put more emphasis on melodies actually played on instruments, and replaced steady beat with shifting rhythm patterns. With an appealing lightness and drive his music rolls on a melancholy current that gives it a Central European flavor, reminiscent of Klezmer.

In a contribution to *ECHO The Images of Sound* (Het Apollohuis, 1987) Dreyblatt discusses the principles of his music, and describes how he developed his tuning system and adapted instruments to play his music.

—RvP

GAMELAN SON OF LION: **NEW GAMELAN/NEW YORK**

CD from GSOL Records, 307 Call Hollow Road, Stony Point, NY 10980

Gamelan Son of Lion is one of the oldest of American Gamelan ensembles. It was founded in 1976 by composers Barbara Benary, Philip Corner and Daniel Goode, and remains to this day a composers' collective and repertory ensemble specializing in writing new music for its instruments, which include American-made keyboards of steel and aluminum, PVC suling (end blown flutes) and clarinet specially made for the ensemble by Steven Silverstein, and Indonesian knobbed gongs and drums. The notes to the album say that the gamelan is tuned in "traditional Indonesian" tunings of slendro (5 notes) and pelog (7 notes) scales, but doesn't go into greater detail in defining the tuning.

The album, their first CD produced on their own label, is subtitled "Contemporary Compositions for Indonesian Instruments," and that fairly well sums up the group's approach. Each composer, while versed in traditional gamelan techniques and forms, uses the instruments and the ensemble to make their own music, which often owes more to their individual interests than to Indonesian traditions. Because of this, the album is very diverse stylistically. It's also extremely beautiful.

Seven pieces, by seven composer/performer members of the group, are played. Jody Kruskal's "Brighton Beach" for two suling and metal instruments, combines both pelog and slendro scales to extend the harmonic range of the ensemble. The first movement of Laura Liben's "Piece for Peace in the Middle East" is for an ensemble of angklung (tuned bamboo rattles) playing tricky polyrhythms. It's one of the most timbrally interesting pieces I've heard in a while. The second and third movements use the other gamelan instruments to work with overlapping rhythmic cycles. David Demnitz, in "Sixties," divides a 60-beat cycle up into all it's factors, and assigns each of the resulting rhythms to a different instrument. The structures in Mark Steven Brooks' "Four Dances for Balinese Angklung" have a lovely clarity to them. The third piece also adds a kokyu, a Japanese gourd violin with a hair-raising vocal-like timbre, to the ensemble.

David Simons' very funny "Kebyar Leyak" is the piece which leaves the timbral world of the gamelan farthest behind. To the sounds of a digital gamelan made from a sample of a wine glass struck with a pencil, he adds a sampler full of quotes from a TV special on UFOs, a trombone, a flute, and an ocarina, to create a piece which, in his words, "is an attempt to bring together two mythologies: disembodied spirits from one culture [the "Leyak" poltergeists of Bali], and alien communications from another planet."

The wonderfully sour sound of the slendro-tuned PVC clarinet is heard in Daniel Goode's "Slendro Clarinet," a piece where Goode displays his clarinet virtuosity while the ensemble plays music extracted and selected from his melodic line. Barbara Benary, who built many of the gamelan's metal instruments, concludes the album with the very lovely "Mostly Slendro Passacaglia," a piece where she combines Western and Javanese harmonic and structural ideas to make a music that is uniquely her own.

I'm very excited by this CD. It's a great example of an ensemble which has adapted instruments from another culture to make a music that is all their own. One of my favorite new music CDs of the year. Highly recommended.

—WB

DENNY GENOVESE'S EXOTIC MUSIC ENSEMBLE: **NEW MUSIC — ANCIENT PRINCIPLES**

Cassette from Southeast Just Intonation Center, Inc., PO Box 15464, Gainesville, FL 32604

This is a very happy album of music played on mostly homemade instruments using a "17-Limit Extended Just Intonation" tuning. Most of the pieces are based on some variety of non-Western folk-based music, and both the playing and the styles of music may remind listeners of some of Lou Harrison's music and also of some pieces by the New Zealand group "From Scratch."

The main emphasis of the sound is pulse-driven and percussive. Drums, bass marimba, xylophones, latin percussion, predominate. Sustained melodies are usually carried by voices or flutes of various kinds. The opening track, Brian Belcher's "Shatamasagana," is based on an African theme, and features a rhythmically tight chorus singing very nicely in tune. The simple ratios of low-limit just intonation sound best to me when sung. Here those intervals shine out wonderfully. Denny Genovese's "Lunar Waltz," with it's off-beat 3-3-3-2-2 rhythm, is good humored and charming. "Sun and Rain," also by Genovese, is based on a Calypso theme. "Matrix," another Genovese composition, is harmonically more complex than the other pieces. I suspect it is the only piece that exploits the 17-limit harmonies (based on the "dissonant" 17th harmonic) to the full. With its percussive background, and wailing of double flutes, this piece reminds me of the opening of Partch's "Delusion of the Fury." "Five in Five" with its constant rhythmic shifts — measures of 3, 2, and 5 beats continually alternate — is a lot of fun, while the Brazilian rhythms and happy improvising with clusters at the end of "Tito the Frog meets Samba the Dog," by Joshua Lederman, finish the album

with interesting timbres and good spirits.

Normally, I have a lot of trouble with the idea that by appropriating various styles and devices from the folk (and non-Western classical) musics of the world, Westerners can create a music that is somehow "purer" or "more authentic" than their own. I think that by naming the ensemble the "Exotic Music Ensemble," though, Denny Genovese shows that he is well aware of the pitfalls of exoticism. And when the music has as much joy and life as this, it transcends any such dangers, and becomes a sharing of delights, rather than a series of "ethnic" appropriations.

—WB

NEIL HAVERSTICK: **THE GATE**

CD and Cassette from Haverstick Productions, PO Box 150271, Lakewood CO 80215

FREDERICK LYMAN: **THE SQUEALERS**

CD from Lyman Technical Research, Inc. PO Box 28, Port Murray NJ 07865-0028

Here are two recordings of music made with altered traditional acoustic instruments. Neil Haverstick uses an electric guitar and bass refretted by John Starrett to play in 19-tone equal temperament. Frederick Lyman has altered a bass "to bring out more of the normally unwanted higher harmonics." Haverstick's recording is mostly straight-ahead rock and roll. Wonderful straight-ahead rock, with a real driving feel, and clever lyrics. Selections are identified as to whether they are in 19-tone or 12-tone, or whether tuning is irrelevant, as in the case of the Native American inspired "Thunderbird," with it's background wash of guitar sustain, and it's sliding, gliding guitar riffs.

Some of the 19-tone pieces feature clever numerical games, such as the "667 Shuffle," which has measures of 6 beats, 6 beats, 7 beats, and also (I think) deals with one way of dividing up the 19-tone scale into two "whole tone" scales and a "diatonic" one. Other 19-tone pieces, such as "Spider Chimes" and "The 19th Planet," leave the realms of funk and groove to explore other musical dimensions. Mostly though, the musical idiom lovingly sticks to the groove, with only the tuning being different, a tuning which gives a bit more "sharpness" and "edge" to the harmony.

Frederick Lyman's CD as well uses a familiar idiom, in this case a relaxed, mellow free jazz. The album has two extended tracks: "Quintet I" for trumpet, baritone saxophone, two basses, and percussion, and "Quintet II" for tenor saxophone, three basses, and percussion. The first seems designed to show the potential of Lyman's altered bass in a more traditionally supporting context, while the 40-minute second track allows the (presumably multitracked) basses to shine in a solo role. And shine they do, in lines of delicate harmonics floating above drones, accompanied by clouds of cymbals and pointillistic saxophone. When the sax is playing softly, in fact, it can often be mistaken for the accentuated harmonics of Lyman's bass. Allowing the higher harmonics of the basses to be heard like this also alters the tuning world of the piece. The "normal" pitches of the saxophone, in fact, often sound like the outsiders, with the basses sliding between the microtonal 11th, 12th, 13th and higher harmonics of different fundamentals. My only criticism is that the performers and composers aren't listed. Even if Frederick Lyman multitracked all the instruments himself (which seems likely), no one is credited with either performance or composition. Still, this lapse doesn't detract from a pleasant and enjoyable album.

—WB

KIM HEINDEL, Lautenwerk: **"AUFS LAUTENWERCK"**

Dorian Discovery DIS-80126 (CD, 1995); available in record stores

In an earlier review-article in *EMI*, "Crow-quill and 'Cat'-gut: The *Lautenwerk* and its Reconstruction" *(EMI* 10/4: 23-4), I discussed two recordings of reconstructions of the Baroque-era keyboard instrument, the Lautenwerk (Kim Heindel, *The Art of the Lautenwerk* [Gasparo GSCD-275] and Gergely Sárközy, *Bach: Suites for Lute-Harpsichord* [Hungaroton HCD 12461-2]). The Lautenwerk, or "lute-harpsichord," is a variety of harpsichord strung with gut instead of wire, and is most often associated, musically, with Johann Sebastian Bach. During the Baroque it was claimed that the Lautenwerk's sound was so much like that of a lute that it could deceive a professional lutenist. But in reality it seems that the Lautenwerk, as a plucked-string keyboard instrument, cannot have the sense of the human "touch" which one gets from a lute (or even a clavichord). If string density, voicing of quills, and placement of where jacks pluck the strings — as well as the nature of the resonating chamber — can indeed be configured in a Lautenwerk so as to effectively give the impression of this "touch," it hasn't happened with the Lautenwerk so far available on recordings.

Kim Heindel's new Lautenwerk recording devoted entirely to works by J.S. Bach, *"Aufs Lautenwerck"* (this title coming from the Lautenwerk indication in the manuscript of Bach's *Suite* in e minor), adds another installment in the Lautenwerk story. For this recording, Heindel uses a different Lautenwerk than on *The Art of the Lautenwerk,* this time a double-manual instrument, also by Martin Harpsichords. (It is perhaps a technical advancement over the single-manual Lautenwerk heard on the earlier recording, but it is unfortunately a somewhat drier, less colorful instrument.) In this collection, Heindel includes five works: all but two of those seven works of Bach's which have traditionally been considered to be for lute. Performing lutenists (and guitarists) have long favored this attribution, but it is becoming increasingly clear with research and the work of performers that is problematic to consider these seven works as being specifically for the lute. It is also problematic, however, to consider them as being, as a whole, specifically for any other single instrument.

These compositions have been often performed and recorded, yet one — the *Suite* in c minor, BWV 997— continues to have a quality of mystery to it. It is musically the most problematic, existing in five different contemporary keyboard manuscripts, none of which is in Bach' s hand, and none of which gives a piece that is playable on keyboard or lute without modifications (an eighteenth-century lute tablature exists for the piece, but omits the two most difficult movements — the fugue and the double of the gigue). Heindel's performance of this piece on the Lautenwerk reveals some of its very interesting aspects. This is especially true of the labyrinthine fugue which is well suited to the Lautenwerk's sound, with its quick decay and a tone stiffer than that of the lute. The double (a melodic quickening) of the gigue also seems uniquely apt on the Lautenwerk as it races around the keyboard, exploring the instrument's thick, voluminous lower range, which has a flexibility not available on a lute (the latter with its bass strings off the instrument's fingerboard). The BWV 1000 *Fugue* (arranged from the fugue of the *Sonata* in g minor for unaccompanied violin, BWV 1001) and the BWV 1006a *Suite* (Bach's own perfunctory arrangement of the third *Partita* in E Major for unaccompanied violin, BWV 1006) receive their first keyboard recordings (it would appear) on this release. Heindel's performances stake no great claim for either of these as works for Lautenwerk, and, with the exception of its opening preludio, BWV 1006a especially is weak in keyboard performance. By far the most interesting on this collection — and most suited for the Lautenwerk — are the e-minor *Suite* (BWV 996, which had also appeared on *The Art of the Lautenwerk* and has been re-recorded for this new collection), the c-minor *Suite* (discussed above), and the *Prelude, Fugue & Allegro* (BWV 998).

Heindel's collection can give no last word on the lute/Lautenwerk controversy. The "Works for Lute" of J.S. Bach, as a whole, are neither perfectly suited to the lute nor the keyboard. What becomes apparent as one spends time with these compositions is that Bach was not necessarily thinking *only* in terms of a lute or of a Lautenwerk, but rather in terms of a quality of "lute-ness" — a palpable and flexible plucked-string-instrument sound, a sound which clearly was being relegated to the background of Western art music by his time — which could be achieved in different ways. Heindel's performance of, for instance, the e-minor *Suite* is another realization of this lute-ness — as would be, say, Hopkinson Smith's lute performance or Julian Bream's guitar performance. Altogether, this capacity to accommodate a variety of approaches is another example of the kind of flexibility that was very much a feature of the musical thinking of Bach, and of the Baroque period itself, of which

Bach's work was manifestly the crowning culmination.

—MC

THE NEW INTERNATIONAL TRIO: **THE NEW INTERNATIONAL TRIO**

On CD from Atomic Theory Records ATD 1102. Distributed by Flying Fish Records

This trio juxtaposes instruments and repertoire from Oriental and Western cultures. Barb Weiss plays virginal and harpsichord; Dick Hensold plays Northumbrian pipes and recorder. Bun Loeung can be heard on a variety of instruments, most of them fiddles from Cambodia. The three seem to share a classical musical training. Their playing is admirable, but virtuosic rather than compelling. However fast they get the notes out, on the whole a certain formality prevents them from getting in full swing.

They come very close to it, though. *In the Mood* skips past in a transparent setting of *tro u* (a Kampuchean fiddle), Northumbrian pipes and harpsichord. From the same instrument Weiss hammers a waltz to underscore *Swinging on a Gate*, a British tune that is ornamented in Cambodian style. The combination of harpsichord and *khim* (a hammered dulcimer) is remarkable; both have a wonderful tinkling sound, one more sonorous, the other more silvery. Also, Bun Loeung knows how to draw a blue note from his *tro*, sliding up only slightly but effectively.

It is the admixture of such apparently incompatible ingredients that the New International Trio is after. And in that they have succeeded, there is no doubt about that. Blending elements from both cultures they pull them to an in between area that does not sound a bit like 'world' or 'fusion.' That in itself is a major achievement.

—RvP

NEXUS: **ORIGINS**

On CD from Nexus #10295. 8740 Wesley Road, Holcomb NY 14469 or Suite 1007, 701 King Street West, Toronto, Ontario, Canada M5V 2W7

Nexus is an improvisatory ensemble of five percussionists. The liner notes state that "the group's five members have developed a unique rapport." *Origins* certainly testifies to that. Bob Becker, William Cahn, Robin Engelman, Russell Hartenberger and John Wyre brought a large collection of instruments to the studio — all kinds of drums and metal ware, tuned percussion, toy instruments, flutes and whatnot. They selected what instruments to use in each piece and, without rehearsing, recorded these seven improvisations.

Not only do they make it work rhythmically, they are also quite successful in combining and contrasting the sound qualities of the instruments. They don't allow the various lines to get muddled, they welcome quietude as an element of the music. They neither overstretch in frantic solos nor do they hurl themselves into high speed pursuit. In fact, the feeling of leisure is often so strong that at certain moments one may lose interest in what is going on. On the other hand even the slightest of sounds has been captured exceptionally well, giving the total sonic image a pleasurable depth.

—RvP

ALAIN PRESENCER: **THE SINGING BOWLS OF TIBET**

CD available from Saydisc Records, Chipping Manor, The Chipping, Wotton-under-Edge, Glos, GL12 7AD, England

By now, most everyone has at least heard of the instruments , the Tibetan Singing Bowls, and the high pitched ringing sounds they produce when stroked around the rim with a wooden mallet. And with musicians like Frank Perry and Raphael Mostel working with these instruments, what more could they offer?

Enter Tibetologist, Dr. Alain Presencer, whose extensive travels and studies in Tibet and her neighboring countries have made quite an impression on his music with these instruments.

The bowls here are made of an alloy of gold, silver, copper, tin, lead, iron, zinc, and bronze. Using the stroking technique described above as well as adding water to the bowls and then tipping them to create different overtones, Presencer is able to elicit a wide variety of sounds and textures that can't help but be contemplative in nature.

The names that he gives to the bowls, like cloud, speaking, and panic bowl, are clearly justified when one hears the tracks, "Bowl Voices" and "Symphony of the Bowls". In these, the *tour de forces* of the bowls give rise to a multitude of sonic personalities.

In addition to the bowls, Presencer gives examples of the shepherd's flute, *gling-bu*, and the human femur trumpet, the *rkang-gling*. Though marginally played, the flute's timbre and tuning are clearly defined. On the other hand, the femur is played beautifully, coming across sounding similar to the sometimes humorous sound of a wavering double-reed instrument. Also present in two pieces are some nasal, muted, harmonic vocalizings used quite effectively.

Though the compositions are slow and sparse, as is often the case with this kind of music, they also provide the necessary space to hear these instruments properly. And although it is not a new disc at all, (1981), this CD proves to be a very good, powerful, and effective musical rendering for Tibet's wondrous instruments.

—SB

TRANCE MISSION: **MEANWHILE**

CD available from City of Tribes, 3025 17th St., San Francisco CA, 94110

With their new release, *Meanwhile*, the San Francisco based group Trance Mission has moved further into the trance and ambient dance and world fusion medium. With instrumentalists, Beth Custer on clarinets, trumpet, samples, and voice, Kenneth Newby on Javanese and Balinese flutes, Laotian Khene, Korean Piri, and electronics, Stephen Kent on didgeridoos and tuba, and John Loose on an assortment of hand drums, drum kit, and kalimba; this group has no fear of running out of instrumentation for their pieces. They only need to face the difficult procedures of instrumental combination and orchestration within good musical composition.

Trance Mission fairs quite well in this regard. Nice atmospherics, sometimes bordering on gorgeous, are scattered throughout the CD with the use of samplers, processing, and exotic and unique instrumental textures. Unfortunately a few pieces, like the opening track, "Go Play Outside", don't seem to get off the ground while relying heavily on jamming, repetition, and timbre changes over a constant groove.

Of particular interest to *EMI* readers will be the great range of instruments featured here from around the world. Along with the percussion of dumbeks, tablas, riqq, pandiero, bodran, and kanjira the wind sounds of didgeridoos and suling, this group also gives us the taste of two original instruments: Peter Whitehead's homemade two-string rebab and Kent's Didgus Maximus. These instruments are featured most prominently in the pieces, "Zozobra", "No They There", and "Surrender." These are some of the most engaging pieces on the disc. If trance dance beats spiced with wet effects and liquidy samples alongside Aboriginal didj drones, Indonesian fluting and jazzy clarinet windings excite you, then this is the one for you.

—SB

THE WISCONSIN CONSERVATORY OF NOISE: **VISQUESTIONARY GLEAM**

Cassette from Audio Muzixa Qet, Rt. 1, Box 131, Lafarge, WI 54639

tENTATIVELY, a cONVENIENCE, NEIL FEATHER, AND FRIENDS: **ATAVISTIC ELECTRONICS & OTHER "OFFICIAL" TOUR/TURE(S) and VOLUNTEER'S COLLECTIVE I-VII**

Two cassettes from Widemouth Tapes, PO Box 382, Baltimore MD 21203

A NAT HEMA: **ANVIL CHORUS**

Cassette from James Boring, 1318 SW 11th, #21, Portland, OR. 97201.

Miekal And and Elizabeth Was are the founders of Dreamtime Village, a community in western Wisconsin devoted to Permaculture (a form of organic, natural agriculture), self-reliance, radical culture, and

creativity. They regularly give seminars and workshops in permaculture, digital tools for self-publishing, networking, instrument building (gourd instruments have been a specialty of theirs), and the like. Their newsletter, *Dreamtime Talkingmail* (available from the same Audio Muzixa address above) is a wonderful publication, with writings not only by themselves but also appearances from such other radical cultural luminaries as Gary Snyder, Hakim Bey, et al. Their musical manifestations appear under the rubric of The Wisconsin Conservatory of Noise. *Visquestionary Gleam* is a tape of two pieces from 1988-89. Side one contains "The Only Catalyst Symphony of Banjovere Jobanick," created "on the occasion of being locked in Luigi's room full of invented banjos and strings." Sampler, voices, ocarinas, and prepared banjos are used, along with vocal contributions from eleven-month-old Liaizon Wakest. The piece might best be described as a long collage of extremely diverse sounds and textures. At times, the sounds are complex and crunchy, with much use made of the pitch-bending possibilities of the sampler. Then, suddenly, there will be moments of only a few plucked string sounds. Technical quality also varies from section to section of the piece. Some moments will be in extreme hi-fi, others will be muffled and muddy. I get the impression that this is intentional on their part — technical quality is not something that they regard as constant, but something that can be treated as another compositional variable.

In this piece, the obvious and the subtle, the corny and the profound exist side by side. This makes it, for me, a true expression of anarchist pluralist sensibilities — all things can float well together. I also hear a connection between the sound world of this piece and permaculture principles — the free way they combine sounds reminds me of the way some permaculturist friends of mine spread different kinds of seeds. Side two, "Chaos Drum Choir," is where they set themselves the task of adapting the drum machine to their own ends. With Drake Scott on Chapman Stick, and Was and And on samplers, drum machines, and voices, the results nod more in the direction of rock sensibility, but it's only a nod. This piece shows how clever they can be with found objects like drum machine patterns. All the resources at their command are used to fragment and stretch the drum machine materials: all types of pitch bending, from sample modulation, to what sounds like tape speed changing, to just plain plucked string-bending, are prominent. Here, "all that is solid" does *not* "melt into air," it glides crazily about! Sounds regularly are piled up until thick bands of noise result, including at the delightfully sudden ending. The two pieces combine anarchist sensibilities with disciplined sound making, and are a fascinating sound output from an important community that has a wide output in a variety of cultural and social spheres.

Less organized socially, but equally active, is the group of musicians, artists, performers, etc. grouped around Baltimore-based multidisciplinary artists tENTATIVELY, a cONVENIENCE* and Neil Feather. Two cassettes, both having moments of high hilarity, document their activities from around 1992. "Atavistic Electronics" is a tape of excerpts from a tour that took Feather, tENTATIVELY, A cONVENIENCE, Peter Williams, John Eaton, and Rebecca Barten to Portland, Maine; Montreal; Toronto; DreamtimeVillage, Wisconsin; Denver; Kansas City, Missouri; and Athens, Ohio. Short excerpts of improvisations and more structured compositions are intercut with gloriously anarchic radio appearances, verbal performances, etc. The result is a lot of fun, especially if you follow the meticulously detailed liner notes. In addition to the comedy value of this album, though, is some very interesting and disciplined playing. tENT frequently provides quite detailed sets of rules for interaction to the players, who respond to them with gusto. I was happily surprised, knowing of this group's anarchist and individualist bent, to hear these sections of unison playing, interaction and group sensitivity.

Their instrumental collection will also warm the hearts of many an *EMI* reader. I quote from the liner notes, which don't explain what any of these instruments may or may not be: "Demi-Nondo, Bendy Guitar, SK1 Sampler, Siren, Trombone, Recombinant Electronics SK1, PortableVibulum, Voice, "Erector Set" Percussion, Lap Guitar, "Terrence Dougherty" Electronics, Trumpet, Audobon Bird Call, Bass Guitar, I.V. Stand Percussion, Alto Sax, Stephanie Palmer Apologetica, Chair, etc." The sound that results from all this is colorful and full of unexpected surprises.

Volunteers Collective, the second cassette, also documents musical activities from this group, this time centered in Baltimore. Feather and tENTATIVELY, A cONVENIENCE again lead the pack, with assistance from a number of other musicians/artists, such as John Berndt, Caroline Armstrong, Sarmad Brody, Chris Astier, Brian Wolle and others. Miekal And and Elizabeth Was also appear as guests on the first track. This tape shows two other sides of tENT: his work as a vibraphonist, which is quite impressive (for all of his wackiness, don't be surprised when he plays with real sensitivity), and his work as a sound sculptor. The sculpture in question is Vermin Supreme, a politician-sculpture that has some kind of speech synthesizer built into it that maniacally and mindlessly keeps repeating slogans such as "Vote For Me," "Why Not the Worst?" "It's Later Than You Think," "Let Me Run Your Life," "I am a Politician. I Will Lie To You. I Have No Reason Not To," etc. The track featuring Vermin Supreme is one of the funniest, but alas, also one of the most chilling (because of its true-to-life nature) tracks of contemporary music I've heard in a long while.

I like the shorter improvisations and structured interactions on side 1 of this tape better than I do the 47-minute single performance of side 2, but this may be just a product of my hearing it after the other three sides of their two cassettes. In any case, these two tapes are a delight.

Also in the category of anarchic sound organizers is the group A nat Hema, from Portland, which consists of James Boring, Timothy J. Scarrott, "and the ubiquitous Mr. Pharmacist." Again, a wide variety of non-standard sound sources are used: a 1950s answering machine, a 5 foot tall speed limit sign, a spring reverb device with guitar strings on it, a talking watch, various talking toys, records, mixing bowl, "non-sex vibrator" (how very modest of them!), "Christian radio," electronics, etc. The group here seems less experienced than And/Was or tENT; they seem a little less sure of themselves. I don't seem to hear the kind of directed energy I do in the work of the other two groups. Nonetheless, some of the sounds produced are quite remarkable. Most of the parts of "The Miracle of My Exhumation," the piece on the first side of the tape, revolve around one kind of repeated sound, with other sounds sporadically placed against it. The third section of side 1 is particularly interesting, with a background of a surging and receding gray noise, and a repeating low "buckleboard" type sound, which I suspect is the speed limit sign being flexed back and forth. Against this, all manner of non-pitched sounds are layered. In another section, the repeating sound is from a record of loon calls. (I've also sampled from the same record. Ain't that just SO annoying when you hear someone else steal what you thought you got to first?) And in still another, tapes of fundamentalist Christian preachers form the base over which things are placed.

The answering machine mentioned above forms the basis for the second side of the cassette, with various anecdotal sounds being dropped into the mix to provide contrast to the more abstract noise-based sounds. Often I get the impression that they're exploring a process of sound making on a particular object, seeing what can be produced with it. Some of the most attractive sounds on the tape, squealing and gliding metallic rasps, seem to be made in this way. Again, my only criticism of this tape is structural: the pieces don't seem to hang together as well as they might. This may be a result of the way in which sounds are attacked — if more directed energy were placed into the way sounds begin, perhaps all would come quickly into focus. Then the remarkable sounds this group makes would shine through even better.

Contradicting many "post-modernist" literary critics, who have been maintaining for years now that nothing "new" is possible, I've obstinately kept looking for groups which are inhabiting the edge of the musical ledge. With these cassettes, I've found some of those groups. If, like me, you enjoy hearing the unexpected and anarchic, you'll like these tapes.

—WB

*[Since this recording was made, tENTATIVELY, A cONVENIENCE has left the city that for years had appeared on his return address as *Bel Tim Ore*.]

RAMBLINGS

From Bart Hopkin, EMI's editor

Today's topic: Scraping.

I like scraping sounds, and I have enjoyed trying to bring out different sorts of scrape sounds for musical purposes. People reading this will probably have an intuitive sense as to what I mean by scraping. Still, pedant that I am, I will to try to give the word a definition. Scraping, for the purposes of this discussion, is when one object rides over the rough surface of another object. The roughness of the surface prevents the first object from sliding smoothly; rather, it jolts along in an indistinguishably rapid series of bumps. Thus, we're actually talking about percussion — albeit, percussion on a minute scale, creating a series of tiny sounds following on one another so rapidly that they seem to fuse into one continuous but rough sound. In this way scraping can be distinguished from the non-percussive sort of friction that is at work in "stick-slip" vibrations like the squeaky door and the violin bow on the string.

In most scrapings both objects (the scraper and the scrapee) radiate at least some sound. Usually they are noisy sounds — that is, sounds that don't have steady frequency components that are readily distinguishable to the ear, and which as a result don't have recognizable pitch. The continuing stream of percussive attacks adds to the noisy effect. Among familiar musical instruments, sandpaper blocks fit this description, and so do guiros and related instruments. But you can also have scrapings in which one of the objects shows modes of vibration with clear pitch and a nice musical quality. This is easy to picture if you imagine dragging some sort of scraper along the roughened surface of a suspended chime. Then you hear the ringing tone of the chime blended with the scrapey sound. The possibility for this sort of noise/tone blend is one of the things that I like about scraped music.

I've made several scraped chime-like things. The picture on the upper left on the facing page shows a tuned chime set made out of EMT (electrical metal tubing, an inexpensive and widely available steel conduit). The best scraper I've found for these tubes is section of rigid wire, maybe 1/16" or 1/8" in diameter, and about 10" long. Some forms of EMT have a textured surface. You can scrape them without further surface preparation, and they'll produce a little sound. But for a more effective instrument, you need to roughen up the playing surface on one side of each chime. I tried several methods which proved reasonably effective: Small cross-wise strokes against a grinder wheel, shallow lateral grooves cut with a hack saw, and going at it with a belt sander using the very coarsest available grit. In general, the shallower and closer together the resulting ridges or serrations, the smoother, finer and quieter the tone. Even relatively coarse grooves don't produce a strong tone — this isn't a loud instrument.

The EMT scraper chimes continue to ring after the scraping stroke is done. This is a pretty effect — the scraped sound followed by the purer, quieter tone of the residual ring. Because of that sustain, to achieve a clearly articulated melody the player must damp each note as he or she sounds the next, with the damping hand following the scraping hand on each note. This isn't hard to do once you get the hang of it. Also for clear articulation, it helps to add a slight extra percussive hit as you begin each stroke. All in all it's a fine, pretty, quiet instrument.

I've also made scraper chimes with steel reinforcement rod, commonly called rebar — another widely available, inexpensive material. Rebar is the solid steel rod, available in sizes from 3/8" thick up to an inch and more, used in building construction for concrete reinforcement. It's perfect for scraping, because it comes ready-made with scrapable ridges on the surface. (In its intended purpose, the ridges prevent the rebar from slipping once set in the concrete.) The disadvantage of re-bar, as compared to the steel tubes, is that, being so skinny, it doesn't have much surface area, and so doesn't radiate sound very well, particularly in the lower frequencies. The higher frequencies come to predominate in the tone. With the overtones in a rod such as this being non-harmonic, the resulting tone is confusing to the ear, pitch-wise. It's an exotic and rather beautiful tone, in my opinion — especially as brought out by scraping — but in any but the very simplest musical contexts, all sense of pitch and melody may be lost in the jangle of non-harmonic overtones. This is more true for longer or thinner bars; somewhat less true for shorter bars. There are some interesting ways to try to mitigate this, but they get rather involved and would take us beyond the scope of this article.

I've also made some *scraped aerophones*. It's tempting to just stop my writing right here and let you wonder what on earth a scraped aerophone would look like, but I'm too talky a personality to do that, so I'll tell you.

To make these things, which I call scraper flutes, I begin once again with a tube, and make a series of shallow, closely-spaced lateral grooves along one side to create a scrapable playing surface. But in this case, the tube is not metal. The material should not be anything resonant in itself, but rather something fairly soft. I have found the flexible black plastic polyethelene tubing commonly called poly pipe to be about right. Having cut the grooves in the tubing surface (more on that procedure in a moment), you scrape with a rather heavy scraper, such as the shaft of a large Philips head screwdriver. The idea is that, with the heavy scraper and the soft plastic, the tube actually gives a bit with each ridge-to-ridge bump. The agitation of the tube sufficiently excites the air within that it produces a clear and reasonably loud tone at the pitch of the resonant frequency of the enclosed air column. The clearly pitched air-column tone blends with the scrapey sound of the scraper on the scraped surface. The tone is rough and raspy and capable of a surprisingly subtle expressiveness, in the manner of a good blues singer. (In that the overall tone actually mixes the sound of the plastic tube itself with that of the enclosed air, this the instrument actually is not purely an aerophone, but something of an idio/aero hybrid.)

A single tube as I've described it here will only produce a single raspy pitch. I have used two methods for giving the instrument more range. One is the obvious: to make a whole set of the tubes cut to different lengths corresponding to different resonant air column frequencies. In this way I produced an instrument with a complete scale over two octaves. The challenge was to find an effective way to mount the tubes. If they are too rigidly mounted, they tend to transmit a lot of unwanted noise to

their mountings, and from there to the table top or floor. You get a lot of rumbling. If they're too softly or freely mounted they don't provide sufficient resistance for good scraping, and they move around too much. Also, it's hard to find a way to hold the tubes securely in place that doesn't interfere with the scraping action. I ended up with a system involving foam rubber support pads and velcro. I still have a lingering problem with the velcro backings coming unglued from the tubes they are supposed to hold, but the details of this situation are too boring to go into.

My other method for getting multiple pitches from the scraper flutes yields an instrument that is smaller, easier to make, and more limited in its capabilities, and yet more fun in some ways. Instead of making many tubes, I make a single tube and give it sideholes, like the toneholes on a flute. There's no noticeable loss of tone quality associated with the toneholes. The limitation is that, since the player must operate the scraper with one hand, that leaves just one hand free to cover and uncover toneholes, for a maximum of five holes and six possible notes.

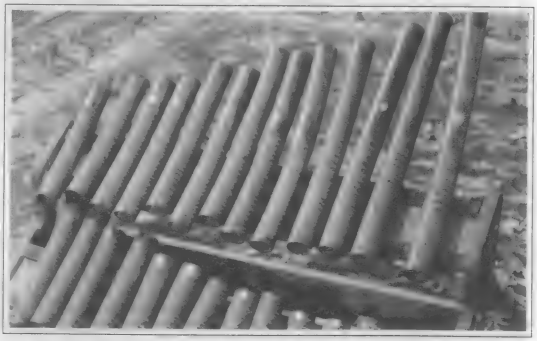
The hand fingering the holes might obstruct the scraping action, but as with a flute, the toneholes appear more toward one end of the instrument. Toward the opposite end is an expanse without holes. That area is serrated, and that's where the scraping takes place.

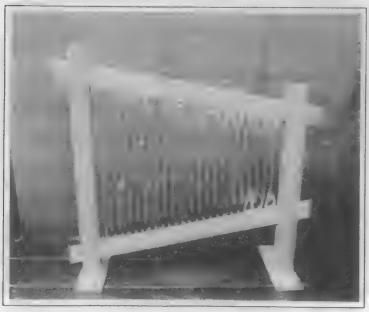
Holding the instrument while simultaneously fingering toneholes and scraping is difficult, so I developed a comically awkward instrument-holding system. It involves using a lightweight bungee cord to strap the flute around the knees. It works nicely in a sitting position, holding the flute securely while leaving both hands free to do their jobs. The comical awkwardness becomes apparent when you forget that it's there, and get up and try to walk with your knees strapped together.

A few more details: The softness of the plastic is essential to the effective operation of the scraper flute. To make it more responsive, it helps to squash it into more of an oval shape, which is less inherently rigid. This instrument works well with rather coarse ridges, typically about 1/4" or 5/16" apart. They can be as deep as the thickness of the plastic allows without danger of excessive weakening. It's easy to cut the grooves at a grinding wheel, using the edge of the wheel (be sure to wear a breather mask). Various sizes of poly pipe can work; I was happy with the 1" diameter pipe.

In addition to the tonehole instruments, I made some scraper flutes with a single open slit, about 3/8" wide, along the area where the toneholes normally would have been. The player can cover and uncover the slit to varying degrees with the free hand, creating gliss effects. You can get a similar effect with a simple, slit-less tube by progressively covering and uncovering one of the open ends with the palm of your hand.

Darrell De Vore, of Petaluma, California, has made similar instruments in bamboo, with a very appealing sound, especially in his own hands. The idiophonic scrapey sound from the bamboo is brighter and louder than that of the plastic pipe, and the clearly pitched aerophonic component of the sound is quieter, though still unmistakably present.





CLOCKWISE FROM UPPER LEFT: EMT scraper chimes, chromatic set of scraper flutes, scraper flute with toneholes (shown with knee strap and a playing card to indicate scale; most of the fingerholes are hidden on the far side), and rebar scraper chimes.

SWORDS INTO PLOWSHARES

Percussionist, Z'EV, Discusses His Work with Titanium and Stainless Steel Instruments

An Interview by Mike Hovancsek

I first became aware of Z'EV when I heard the work he was doing with the legendary and controversial group, Psychic TV. Psychic TV was one of the groups that influenced the punk, industrial, and noise movements while constantly remaining one step ahead of all the self-proclaimed trend setters. Later, I heard Z'EV's work with symphonic composer, Glen Branca and, still later, Z'EV and I were invited to perform at an experimental music festival as part of New Music Across America.

At that time, Z'EV had taken on such a mythical status in some strata of the new music world, I had no idea what he would be like in person. I had heard from various semi-reliable sources that he was a homeless, psychotic genius some of whose work in the early 80's was likened by the NYC press (WIMPS) as "violence personified." I also heard that he had just completed a fairly heady book about the use of rhythm in ritual and ceremony. Listening to his complex and highly unusual percussive music, it was hard to determine whether or not these rumors had any basis in fact. One thing was certain; The music I had heard was crafted by an extremely interesting and unique person.

When I met Z'EV, I had to admit that, with his shaved head and his worn combat boots, he *did* look a bit like the type of guy who would try to sneak a bomb into the passenger compartment of an airplane. To my relief, however, Z'EV turned out to be a really nice and highly intelligent person. He showed some interest in my work and in other new approaches to music.

When it was time for Z'EV to perform, he played a single, relentless, hour-long percussion piece on stainless steel gongs and titanium pipes. The resulting music was a dense barrage of rhythms, overtones, and shifting textures that were as exciting as they were meditative.

Some time later, Z'EV and I talked about contributing to my musical projects. At the same time, I decided to try to squeeze in an interview so that I could attempt to separate the facts from the fiction in the career of this unique artist. The following excerpt is from a longer interview that I had published elsewhere.

MIKE HOVANCSEK: How did you get started working with titanium gongs and pipes?

Z'EV: I have no titanium gongs. Finding a suitable form to begin with would be fairly hard because they don't make tanks out of titanium. For gongs I prefer to use stainless steel.

Instruments start out as found objects of various forms — circles, rectangles, squares, or cubes, tubes — of a material that I'm interested in.

Then, they get tuned. That is the basic process that I'm involved in with them. That is what turns them into an instrument. It's similar to the oft told concept of sculpture where the artist is said to "liberate" the form that is already inherent in the mass they are confronting. I'm not liberating form but, rather, *song*.

MH: What is it about titanium that interests you?

Z: It is axiomatic that the more heat and pressure are expended in the production of an object of a given material — the greater sonic potential there is when that object is *sounded* (struck, bowed, etc...). Titanium is at the very highest end of this scale.

MH: How did you get your hands on titanium?

Z: The first pieces I obtained were cost overruns from the titan nuclear subs. They were from the cooling system in the missile bays. If a missile was launched — and as it was burning in the sub, developing the power to blast its way up from the bottom of the sea —the outside water would be pumped at super high pressures through this titanium tubing. This is how it was explained to me.

The water (and very cold water it is down there) would almost instantly turn to steam. While the titanium tubing would be white hot, it would still maintain enough structural integrity to convey this steam.

Another military use for titanium based on this same propensity is its use in anti-tank missiles. Basically, you fire a cone shaped mass of titanium at a tank. The titanium turns white hot and melts its way through the tank, splattering those inside with the now molten remains of what were, moments before, armored plates.

And yes, there is more than a bit of a "sword into plowshare" intention in my use of this material, none of which would matter, really, if it did not produce the most awesome amounts of acoustical phenomena when it is resonating.

MH: What ideologies have you embraced or developed in the course of your musical career?

Z:"Empowerment of the Audience" and "Shamanistic Qabala".

MH: Can you describe these ideologies?

Z: Back in the '70s to mid '80s there was an issue being batted around by composers from Robert Ashley to etc... to Z'EV regarding forms of improvisation which were felt closer to formal composition than to improvisation as it is commonly practiced. In line with this, I was seeing composition as a dialog-ical as opposed to monolor-ical process: That what the audience, themselves, heard was the composition.

This arose as a direct result of the music I was producing at the time: The assemblages and the performance-based instrumental technique (i.e. moving the instruments through space). The music was actually a form of orchestrated acoustic phenomena.

The result was a negotiation between the instruments and the actual physical space, with the space affected by and then affecting the sonic energies the instruments produced. The music took shape in this negotiation/interaction as much as, or even more than it came about as a piece I "intended" to play.

It was a very rich and dense sonic field that resulted. It was up to the audience to decide which line to hold as rhythm, which as melody, which as harmony, etc... For example, a common response from audience members in the late 70s would be "You know, tonight I finally heard the music". They realized that the music had been there all along. But now they heard it. Now they had come to grips with organizing it for themselves.

This also relates to the bottom line definition of music as sounds you like vs. noise as sounds you don't like. This is also universally noted in people's response when first faced with any other culture's music. For example, they are unable to organize it to the point where they can appreciate it as music. So then, whenever I am in the musical process of generating acoustic phenomena in performance, it is then axiomatic that the audience is equally and actively involved in creating their listening experience. I see that as empowering them.

MH: What about Shamanistic Qabala?

Z: Bottom line, "qabala" simply means tradition. It specifically relates to oral traditions. In the West it is generally considered an astral/cosmological system, based in/on the planets and the stars, embracing a highly developed system of correspondences between particular dynamics of cause/effect and concept/form embodied in humanity and cosmos. The traditions that I draw upon have to do with the effectiveness of rhythm — its ability to invoke particular mental states, contribute to the healing process, etc... This is the Shamanistic statement — and the qabala-istic — in that I have adapted the animistic/earth-based conception of shamanism and wedded it with the "highly developed system of correspondence" extant in the Qabala.

MH: You wrote a book about your musical ideas. What kinds of ideas did you explore in it?

Z: The book I wrote in 92 was entitled *Rhythmajik, Practical Uses of Rhythm, Sound, and Number* and was published by Words & Jackie of Temple Press out of Brighton, England.

It is not about music per se but more specifically about the use of rhythm and sound for trance, healing, etc... Basically, it strips away the Judeo/Christian mysticism from what is known as the Qabala and presents it in as neutral a form as it has ever appeared. There are over 5000 beat patterns included under a variety of headings. It also includes possibly the most evolved numerological dictionary/grammar extant. The book has applications for people interested in Tarot, astrology and numerology, apart from any specific interest they might have in sound.

MH: Is there a unifying theory that links your visual and sonic works?

Z: A unifying theory? Rhythm. Visually there is rhythm in variety-of-line and in the contrast of light versus dark, in the cadence of language and of course in sound — pitch — timbre-amplitude. All can be seen in terms of rhythm.

Z'EV can be reached via e-mail at datadump@aol.com, or by fax at (818) 365-4079.

In Experimental Musical Instruments' March, 1995 issue, there appeared an article by Mitchell Clark entitled "Poetry and Poetics of the Aeolian Qin," which focussed on passages in ancient Chinese poetry referring to ancient zither called the qin being sounded, aeolian harp-like, by the wind. The article followed our series on aeolian harps and their makers in the preceding two issues. All of this inspired aeolian harp maker Ken Turkington to send these notes on the poetics of the aeolian harp in 19th century America.

Ken's own aeolian harps, shown below, are reproductions of the Henry David Thoreau harp discussed in the essay.

WHAT WAS WALDEN POND TO THOREAU? 150 YEARS OF FORGOTTEN RUMORS

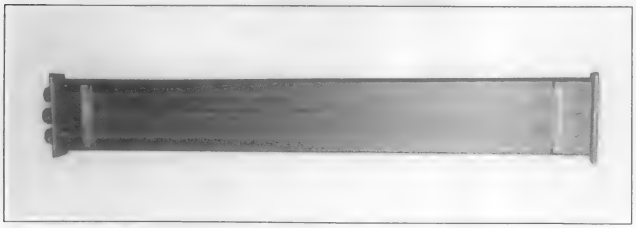
by Kenneth "Turk" Turkington

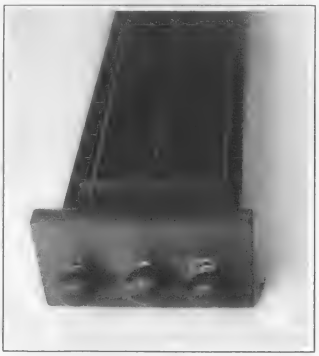
It is well known that Henry David Thoreau enjoyed music and played the flute. We even know which pieces of music he played. What has eluded most Thoreau scholars is the other instrument he owned. Missing from his journal is any mention that he or his brother John made an Aeolian harp. The importance of this wind harp to him becomes clear when you review Thoreau's life from 1837 through his Walden Pond experience. You know his love of its sound when you look to the entry in his journal for December 31, 1853: "The strains of the aeolian harp and of the wood thrush are the truest and loftiest preachers that I now know left on this earth." In addition, Thoreau wrote one of the best poems about the aeolian harp, "Rumors from an Aeolian Harp." Ralph Waldo Emerson, too, considered it among his favorite sounds as his son Edward indicated when he recalled, "Echo, the booming ice on the pond or river, the wind in the pines and the Aeolian harp in his west window were the sounds he best loved."

Henry David Thoreau and John Thoreau grew up in the swamps, farms and woodlots near to the Sudbury and Concord rivers, west of Boston, Massachussetts, with many sultry summer afternoons spent gliding along the still but moving river. In 1843 John died in Henry's arms, and depression set in. For two years it continued. His friends Ralph Waldo Emerson and Ellery Channing encouraged him to write the book *A Week On The Concord and Merrimack Rivers*, which he wrote at Walden Pond. In it he relived the trip he took with John rowing through the tranquil but active marshes along the Concord River. Among the recollections included in that writing were memories touching upon the aeolian harp building that they both had done. Another of the book's passages speaks of the singing in the wind of the telegraph wires that had recently been added to train tracks across the country, creating the largest musical instrument known to man. The poem reprinted here comes from that work as well.

When you look at the design of aeolian harps made by his contemporaries and compare them to the structure of the harp that Henry Thoreau made, you get an insight into his philosophy. In that harp I see simplicity, style and elegance (the elegance one sees in a mushroom's gills and veil).

The story of Henry David Thoreau's aeolian harp isn't one of the isolated acts and interests of an isolated and important man; it is a complex story reaching forward and back through the centuries. Emerson saw a unique talent in Henry and opened his library to him, especially translations of oriental scriptures he couldn't find elsewhere. Emerson's readings of 16th century poets may have brought this mystical instrument to his thoughts, leading John Thoreau to build a wind harp for Emerson so that Aeolus could join in the dialog. (That harp is still in Emerson's house, but it is silent, for the house is now a museum.) The poetry of Emerson may have inspired Isabella Stuart Gardner to acquire





ABOVE AND RIGHT: The aeolian harp of Henry David Thoreau, as recreated by Ken Turkington.

an aeolian harp and place it in her favorite sitting room. Her husband had passed away and the museum had been built, and I cautiously speculate that this instrument may have given to her a connection to the spirit she missed.

At the Hotchkiss School in Lakeville, CT, Richard Hughes teaches British Romantic poets and the aeolian harp as a major symbol, with Coleridge, Wordsworth and Keats. After reading Coleridge's *The Eolian Harp* aloud, the students listen to a recording of aeolian harp music, and when they return to the poem they see how Coleridge captures the cadence of the harp melody in the verse. He follows with the New England transcendentalists, Emerson and Thoreau, and Whitman. Richard has taught this at the school for many years and may be the only one to use the harp or its music in the classroom. He is teaching in a way of which I think Henry would have approved.

The poem on the right is one of several surviving writings relating to the aeolian harp from this period in American literature. Similarly prominent is an extended poem from Ralph Waldo Emerson entitled "The Harp." Literary references to aeolian harp have been researched and gathered in Stephen Bonner's series of volumes entitled *Aeolian Harp* (published by Bois du Bologne, Cambridge, 1968-1974. The literary references appear in Volume Three, *The Aeolian Harp in European Literature*, by Andrew Brown; Stephen Bonner, series editor). The Bonner book is now unfortunately out of print and extremely rare.

In addition landscaping and woodsculpture, author Ken Turkington is reproducing aeolian harps modelled after the Henry David Thoreau instrument, and has produced a tape cassette of its music. For more information or to order the Thoreau harp or cassette, contact Turk at 35 Russell Hill Road, Brookline, NH 03033.

RUMORS FROM AN ÆOLIAN HARP

There is a vale which none hath seen,
Where foot of man has never been,
Such as here lives with toil and strife,
An anxious and a sinful life.

There every virtue has its birth.
Ere it descends upon the earth.
And thither every deed returns,
Which in the generous bosom burns.

There love is warm, and youth is young,
And poetry is yet unsung.
For Virtue still adventures there.
And freely breathes her native air.

And ever, if you hearken well,
You still may hear its vesper bell,
And tread of high-souled men go by,
Their thoughts conversing with the sky.

— Henry David Thoreau

A FEW MORE RECORDINGS OF AEOLIAN STRINGS

A continuing discography compiled by Bart Hopkin with Sasha Bogdanowitch and Mitchell Clark

In Experimental Musical Instruments' March 1995 issue, as an adjunct to Mitchell Clark's article on aeolian qin, there was a brief, non-definitive "Primer Discography of Aeolian Instruments," listing a half dozen recordings of wind-activated strings. Since that time a few more such recordings have come to our attention. So, while we're still well short of the final word on the subject, here are some additional listings .

KEN TURKINGTON:
HENRY DAVID THOREAU'S AEOLIAN HARP MUSIC
On cassette from Walden Winds, 35 Russell Hill Road, Brookline, NH 03033; phone 1-800-692-HARP. A CD is expected in spring.

This is a recording Ken Turkington's reproduction of the Thoreau aeolian harp discussed in the accompanying article.

RON KONZAK: **HARPS IN THE WIND**
Acme Music & Storm Door Co., Box 4494, Rolling Bay, WA 98061. Produced in 1985; now out of print.

One side of this cassette contains sounds of the Puget Sound Wind Harp, which is a 23-foot harp-shaped aeolian instrument with a "deep, sombre" tone. This harp was the subject of an article in *Experimental Musical Instruments* Volume I # 3, and can also be heard on the *EMI* Volume I cassette (see listing below). The other side contains sounds of a small folk harp singing in the wind in "light, capricious melodies and glissandos."

ALAN LAMB: **PRIMAL IMAGE**
CD from Doboro; distributed by Impetus Distributors, PO Box 1324, London W5 2ZU, England. Produced 1995

Contact mic recordings of telegraph wires sounded by the wind in the Australian desert.

SARAH HOPKINS AND ALAN LAMB: **SKY SONG**
On CD from Austrailian Broadcasting Company Music 838503-2; produced in 1990.

Sarah Hopkins plays cello in duet with Alan Lamb's telegraph wire recordings.

JIM METZNER, ed.: **PULSE OF THE PLANET: EXTRAORDINARY SOUNDS FROM THE NATURAL WORLD**
Book and CD from The Nature Company, PO Box 188, Florence, KY 41022. Produced in 1994.

In this very diverse collection of both human and natural sound, one selection is a recording of a traditional aeolian harp.

WIND-ACTIVATED STRINGS ON THE *EMI* CASSETTES

Several recordings of aeolian strings have appeared in past volumes of the *EMI* cassette series, *From the Pages of Experimental Musical Instruments.* Later volumes of these cassettes (Volumes 6, 8, 9 & 10) remain available from us here at PO Box 784, Nicasio, CA 94946 ($8 per volume; each volume is one cassette). Earlier volumes are now out of print.

The Puget Sound Wind Harp, on the cassette From the Pages of *EMI* Vol. 1. This is an excerpted recording of the same harp described for Ron Konzaks'

entry earlier on this list.

Spirit Catchers and Windwands, on the cassette *From the Pages of EMI* Vol. 5. Darrell DeVore's spirit catchers and windwands are not, strictly speaking, activated by the wind, but are close enough in principle: they are hand-held chordophones that sound when you whirl or wave them rapidly through the air.

Windharp at Redcliffs, Victoria, Australia, on the cassette *From the Pages of EMI* Volume 10. This is an excerpted recording of Ros Bandt's large scale wind-string installation described in *EMI* Volume 10 #1.

RECENT ARTICLES, continued from the back cover

mond St. West, Toronto, Ontario, Canada, M5V 1V3.)

The author discusses his sound works based, in various ways, on the idea of the loudspeaker. In one series of works, he retained the visual aspect of the loudspeaker by using speaker boxes but replacing the innards with natural acoustic sound sources, visible to those who choose to inspect through transparent back walls. In other works he has used loudspeaker-like mechanics — electro-magnetically driven sound-radiating surfaces — in applications that are very unlike loudspeakers in their visual aspect.

"Anarchy Economy and Music Part 2: & the Deadbeat Goes On & On & On.." by tENTATIVELY, A cONVENIENCE, also in **Musicworks** 63 (address above).

tENTATIVELY, A cONVENIENCE, whose work with improbable sound sources has appeared in EMI Vol. VI #1 and elsewhere, doesn't specifically discuss sound instruments here except in passing, but his ideas and activities remain part of the gestalt. Similarly, "I am not Greg Curnoe" by Jack Behrens, also in Musicworks 63, looks at the work and ideas of the late Greg Curnoe — another notable maker and manipulator of sound instruments — while focusing primarily on other aspects of his work.

"Hearing Through Wires: The Physiophony of Antonio Meucci" by Gerry Vassilatos, in **Borderlands** Volume LI, #4, Fourth Quarter 1995 (PO Box 220, Bayside, CA 95524).

An article on the 19th-century inventor Antonio Meucci. Meucci worked in electronic sound transmission, anticipating the work of Alexander Graham Bell. Important demonstration models representing his work were lost under suspicious circumstances, and his work has been lost to obscurity since.

"Vocal Motors: Sound Mills and Phonometers", also in **Borderlands** Vol. LI #4 (address above).

A collection of three 19th-century writings (one being the specification statement for a patent granted to Thomas Edison) for sound engines, which are devices which convert sound energy into rotary movement.

Mental Notes (PO Box 1764, Sebastopol, CA 95743) is a newsletter devoted to Waverider. The Waverider company makes hardware and software packages that read brainwave patterns through galvonic skin response, and allow the user to translate them into musical sound through a variety of user-specified mappings. The Autumn 1995 issue features articles on social and technical aspects of different people's use of the software.

Several articles of note appear in **American Lutherie** #43, Fall 1995, including:

"Prepare to Meet the Maker: Jim Williams" and "Lattice Bracing Guitar Tops", an interview with and a talk by Jim Williams, a pioneer of unusual bracing methods for guitar soundboards.

"Prepare to Meet the Maker: Jess Wells", an interview with a maker of viola da gambas, with a viola da gamba plan included.

"Calculating Fret Intervals with Spread Sheet Software", by Wayne Kelly: an idea for using spreadsheet software to calculate fret spacings for fretting string instruments.

The Music Trades October 1995 issue contains several articles on the development of the guitar. "Is the Guitar Fully Evolved" places recent developments in guitar design in the context of the instrument's 20th-century history, focusing on a period of significant change occurring from the 20s through the 50s. "Despite Limited Output Santa Cruz Makes Big Impact" highlights the manufacturing methods of Santa Cruz Guitars, and "The Beauty of Wood, the Strength of Synthetics" features Brian Moore electric guitars, with bodies made of a natural wood front wedded to a back made of strong, rigid composite plastic.

Continuo Vol. 19 #5, Dec 1995 (PO Box 327, Hammondsport, NY 14840) contains several articles on rare old instruments: "The Recently Discovered Denner-Flute in Recording and a Conversation with the Artist, Konrad Hunteler" by Mary Oleskiewicz, features an important, recently unearthed 18th-century flute. "Two Magnificent Baroque Lutes," by Michel Cardin discusses two lutes of the late baroque; and "Richard Belt," by Richard Belt, contains autobiographical notes by a maker of fortepianos.

FoMRHI Quarterly No. 81, Oct. 1995 (171 Iffley Rd., Oxford OX4 1EL, U.K.) contains, among many other things, several articles on early musical strings and their manufacture, plus a description of a crudely made early Italian fortepiano which inspires the article title, "Was the fortepiano built as a folk instrument?"

Noise Gate #1 (c/o 20 Wake Rd., Nether Edge, Sheffield, S7 1HG, England) contains several noteworthy articles, including:

"Developing Sound Therapy Equipment" by David Mitchell. A report on the development of "a range of furniture which utilized the therapeutic benefits of musical vibration to help the deaf and severely disabled."

"Whirled Revolution: an investigation into rotary sound" by Paddy Collins. A discussion on instruments which produce sound by whirling or spinning motions, with descriptions of instruments and sound installations created by the author, Max Eastley, Gordon Monahan and Sean Reynard.

"The Simplified History of Electronic Instruments, Part 1" by Sean Reynard. A listing, with very brief descriptions, of electronic instruments prior to the second world war.

"A Pound for your Sound: Introducing the 'Sonic Sound Structure'", by Scott Hawkins. A description of the author's musical playground structure.

"Johnny White and his very big guitar," by Paddy Collins. A description of a guitar scaled up proportionally to eight feet long. Apparently it is playable, but because it is difficult to play in the conventional manner it is sounded by a set of pneumatically driven rams controlled by electronic timers creating random sequences.

"The insect orchestra" by Paddy Collins. A one-page graphic with text illustrating the idea that one could take musical advantage of the fact that insects of different species have different wing-flapping speeds dispersed over several octaves in the lower part of the hearing range.

New Instruction Video: You too can play the Musical Saw. Everything you need to know. $29.95. From Charlie Blacklock, 1821 St. Charles St., Alameda, CA 94501. [11-3]

PIPEDOWN is a campaign against piped music (muzak). For information contact Pipedown at 6 Kingsley Mansions, London W14 9SG, England. [11-3]

The Pauline Oliveros Foundation enters its second decade with a new 3-year certificate program in Deep Listening, a new catalog, a new Deep Listening recording label, and deep listening expeditions. For a catalog or information contact the Pauline Oliveros Foundation at PO Box 1956, Kingston NY 12401-0900, email Oliverosfd@aol.com; World Wide Web site at http://www.tmn.com/oh/artswire/www/pof/pof.html. [11-3]

Burnt Earth - Ceraminc Musical Instruments by Barry Hall can be seen and heard on the World Wide Web at http://www.ninestones.com/burntearth.shtml. This website is designed to let you view and listen to hand-crafted ceraminc musical instruments created and built by Northern California musician Barry Hall. Drums, didjeridus, horns, flutes, fiddles and unusual hybrid instruments are among the creations represented. For more information contact Barry at barry@ninestones.com or send SASE to Barry Hall, 172 Springside Rd., Walnut Creek, CA 94596 to receive printed information and a list of instruments for sale.[11-3]

BROADCASTATIC WVCW 640 AM / 105.3 Continental Cable FM: Experimental music radio show. Music & Noise; Fun with Tape Recorders, Record Players, annoying sounds. Please send tapes & mail to: TOMMY / PO Box 7222 / Richmond, VA 23221. [11-1]

Mathematical Models of Musical Scales: A New Approach, by Mark Lindley and Ronald Turner-Smith. A 300-page, hard-cover book, new from Orpheus, Verlag GmbH, Verlag für systematische Musikwissenschaft, 53129 Bonn, Eduard-Otto-Str. 41, Germany. [11-2]

WAYLAND HARMAN'S CLACKAMORE — "THE WORLD'S NEWEST PERCUSSIVE MELODY INSTRUMENT." Clackamore $23.00 ppd, PVC case $6.00 ppd, instructional video $20 ppd. PO Box 6444, Boise ID 83707. THE CLACKAMORE — A TOOL FOR LISTENING TO THE SHAPE OF YOUR MOUTH. [11-2]

Thoreau's Aeolian Harp music as he heard it at Walden Pond. Tape cassettes of the music from this harp accompanied by songs of the wood and hermit thrushes. Harp reproductions of his own design available in Walnut. Ken Turkington 1-800-692-HARP. [11-2]

The Hawaii Bamboo Conference takes place May 25-27 1996. For information contact Richard Waters at PO Box 1071, Pahoa, HI 96778, phone (808) 965-0955; e-mail bamboomuse@aol.com. [11-2]

The Power of Sound: An 8-month program focused on the transformational and therapeutic applications of music and sound, from the Institute for Music, Health & Education. Classes meet four weekends. Programs in California and Maryland this fall and spring. For information call (800) 490-4968. [11-2]

Multi-instrumentalist/composer MARK WHITECAGE offers "Watching Paint Dry" cassette featuring his sound sculptures, horns, compositions with Rozanne Levine, Joe Fonda, Mario Pavone, Gerry Hemingway. $12.00 includes postage, check/m.o. payable to "Mark Whitecage" c/o acoustics, 406 Washington St., Hoboken, NJ 07030, tel/fax (201)798-2166. [11-1]

Earthshaking Percussion: Djembe, Talking Drums, Didjeridu, Dumbeks, Typan, Frame Drums, Surdo, Pandiero, Tabla, Cajons, Clave, Angklung, Balafons, Clay Pot Drums, Kanjira, Bodhran, Sitar, Harmonium, Shekere, Slit Drums, Caxixi and much more. Call (404) 624-3349 for free catalog & color photos! [10-4]

Incantors — Q.R. Ghazala has recently bought out another small inventory of brand new and increasingly rare Texas Instrument Speak & Maths. These devices are the heart of the most deluxe and best sounding incantors to date. Price is $240 (reflecting only parts plus bench fee at repair shop hourly rates). Finished instruments are fluorescent green and gold. Controls include looping, speed/pitch dial, milk glass and brass electric eye (sequences loops with a wave of the hand), body-contacts for inter-flesh modulation, envelope LED, three voice-bending switches and reset switch. All incantors include blue fluorescent alpha-numeric display, monitor speaker, line output, custom patch cord, and instruction sheet. Amazement guaranteed. Owners consider the INCANTOR to be the ultimate experimental music box. For more information, see the INCANTORS article in EMI Vol VIII #6, June 1993, or write to Reed at Sound Theater, Echo 241, 7672 Montgomery Rd., Cincinnati, OH 45236, USA. See the Sound Theater World Wide Web sit at http://www.iac.net:80/~cage/reed.html. [10-3]

A book by Bart Hopkin, editor of *Experimental Musical Instruments*, has been published by Lark Books. **Making Simple Musical Instruments: A Melodious Collection of Strings, Winds, Drums & More** is a collection of plans for home-buildable musical instruments, ranging in difficulty from simple to moderate. The book is written for a general, non-specialist audience, and the approach is non-technical. The instruments aren't so very far out: most of them relate to familiar instrument types and are playable as such. Yet even experienced experimenters will find some new ideas here. It's hardbound, with 144 big and very full pages, lots of color, beautiful photos & illustrations; price $24.95. Order from Experimental Musical Instruments, PO Box 784, Nicasio, CA 94946, USA, phone (415) 662-2182 [10-4]

Air Columns and Toneholes: Principles of Wind Instrument Design is a spiral-bound booklet containing the four articles on practical wind instrument acoustics by Bart Hopkin that appeared in EMI in 1992 and 1993. The articles have been much revised and improved, and there are several additional features included. Published by Tai Hei Shakuhachi; available for $12.50 (no additional postage required) from Tai Hei Shakuhachi, PO Box 294-C, Willits, CA 95490, or from *EMI*, Box 784, Nicasio, CA 94946.[9-4]

A REMINDER — Unclassified ads here in *EMI*'s notices column are free to subscribers for up to 40 words; 40¢ per word thereafter. For others they are 40¢ per word, 15 word minimum, with a 20% discount on orders of four or more insertions of the same ad.

DISPLAY ADS IN EMI are more affordable than you might think. $60/half page, $40/quarter page, $25/eighth page. If you have a product or service that you'd like to promote just a bit more conspicuously, call or write for details: EMI PO Box 784, Nicasio, CA 94946; phone/fax 415/662-2182.

SUBSCRIPTIONS TO *EMI*: $24/yr for U.S.; $27/yr for Canada & Mexico; $34/yr overseas. Order from EMI, Box 784, Nicasio, CA 94946, USA. Visa/MC accepted.

EMI BACK ISSUES: Bound volume sets Vol 1 through Vol. 10: $17 per volume. Each volume set contains all of the issues of one volume year, photocopied and bound under one cover. The photocopies are a step down in quality from the original press runs, but they are readable still. The price includes postage for U.S., Canada & Mexico air, and overseas surface rate. For overseas air add 20%. In California add 7.25% sales tax. Visa and MasterCard accepted. Order from EMI, PO Box 784, Nicasio, CA 94946, or write for a listing of back issues and their contents. Corresponding cassette tapes are available for later volumes; see information below.

CASSETTE TAPES FROM *EMI*: Each cassette in the EMI cassette series contains music of instruments that appeared in the newsletter during the corresponding volume year, comprising a full measure of odd, provocative, funny and beautiful music. Volumes VI, VIII and 9 and 10 are available (earlier volumes are now sold out). The price is $8 per cassette. This includes postage for air delivery in the U.S., Canada and Mexico, or surface delivery overseas. In California add 7.25% sales tax. For overseas air add $20%. Order from EMI, Box 784, Nicasio, CA 94946. Visa and Mastercard accepted.

The following is a list of selected articles relating to musical instruments which have appeared recently in other publications.

"The Conn-O-Sax Conn-cedes Defeat" by Margaret D. Banks, in **The Shrine to Music Museum Newsletter** Volume XXIII #1, Oct 1995 (414 E. Clark St., Vermillion, SD 57069).

A history of the Conn-O-Sax, a variant on the saxophone produced by C.G. Conn Ltd. in the 1920s, a rare example of which survives in the Shrine to Music Museum. The instrument was a straight-bodied mezzo-soprano sax in F with an unusual spherical bell.

"Trimpin's Music" in **On Center** Vol. VII #4, Late Autumn, 1995 (PO Box 1695, Port Angeles, WA 98362).

This article appears in conjunction with an exhibit of an interactive installation called Liquid Percussion at the Port Angeles Fine Arts Center by the sound sculptor Trimpin. In addition to discussing the exhibit, the article provides background on Trimpin himself, and his extraordinary ongoing series of computer-controlled, mechanically activated sound works.

"The Eames Drum Company" by Jon Cohan in **Not So Modern Drummer** Vol. 8 #1, Nov/Dec 1995 (119 Old Hickory Blvd., East Madison TN 37115).

A discussion with Joe MacSweeney of the Eames Drum Company, one of the last companies making wooden shells for snare drums and tom toms by hand using traditional methods.

"Singing the Body Electric" by Mark Sinker, in **The Wire** #139, September 1995.

A well-informed article on early electronic instruments, including theremin, telharmonium, trautonium and others. Excerpted from the author's forthcoming book, *The Electric Storm*.

"Calculating Bridge Correction" by Mark French, in **CAS Journal** Vol. 2 No. 8 (Series II), Nov. 1995 (112 Essex Ave., Montclair, NJ 07042-4121).

A mathematical approach to the problem of bridge location in fretted instruments, compensating for the effects on pitch of changes in string tension due to the string displacement in the playing action of fretting.

"Alaska Report" by Jim Nollman, in **The Interspecies Newsletter** (273 Hidden Meadow Lane, Friday Harbor, WA 98250).

Jim Nollman, of the organization Interspecies Communication, sometimes makes use of an underwater sound system hooked up to an electric guitar to play in the presence of dolphins and whales, seeking to develop interaction based around patterns of sound, as described in *EMI* Vol VI # 4. In this excerpt he describes a recent encounter with humpback whales.

"The Chinese Connection: Harry Partch and the Li Po Settings" by Lydia Ayers, in **1/1** Vol. 9 #2, Oct 1995 (535 Stevenson St., San Francisco, CA 94103).

An exploration of the idea that some of Harry Partch's ideas on tuning may reflect an early exposure to Chinese music.

"In Performance: Bill Close's Musical Inventions" by Fred Camper, in **The Chicago Reader**, Sept. 1 1995.

Notes on instrument maker Bill Close of the performing group MASS, who has created longitudinally vibrating strings in the mode of Ellen Fullman's Long String Instrument, a musical bench with strings and chimes for children, and other sound instruments.

"Fabriquer un Kaiamb" by Marie-Christine Salles, in **Percussions** No. 41, July/August 1995 (18, rue Theodore-Rousseau, F-77930 Chailly-en-Biérre, France).

Information on the history and the construction of the kaiamb, a shaken idiophone made from sugar cane stems, used in Kenya, Tanzania and Reunion Island. (In French.)

"Le Chekeré: dans la Musique Religiouse" by Lino A. Neira Betancourt, also in **Percussions** (address above).

A report on the Nigerian beaded gourd rattle, the shekere, and its descendants in Cuba, with additional notes on its role in some Santeria ceremonies. (In French.)

"Automatic Music", in **Logos-Blad** 17 #10, October 1995 (Kogostraat 35, 9000 Gent, Belgium).

A report on mechanical instruments by Jacques Remus. (In Dutch).

"Plunderphonics, Part 2" by Chris Cutler, in **Resonance** Volume 4 #1 (60 Farringdon Rd., London EC1 R 3BP, England).

This is the second half of a report on the contemporary practice of musical borrowing in defiance of copyrights (mostly, the use of sampled segments of existing recordings as parts of new compositions). Plunderphonic sound artists Christian Marclay, John Oswald, and The Residents are discussed, among others. Cutler's article is followed by a first-hand account from Matt Wand of the group Stock, Hausen & Walkman describing how their CDs, containing some plundered material, were held up at the manufacturing plant when the plundered samples came to the attention of the wrong people.

"Beats the can Push Sugar", an interview with Alvin Lucier conducted by Michael Parons, also in **Resonance** Volume 4 #1 (address above).

"Sound is subtle. It is subtler than light or color, I think, because sound waves don't do what you want them to do." A discussion with the most thoughtful explorer of the territory between the physics and the aesthetics of sound.

"String Band Evaluation (Part 4)" and "String Band Evaluation (Part 5)" by Joseph Jourdain, in **Folk Harp Journal** #89 and 90, Fall and Winter 1995 (4718 Maychelle Dr., Anaheim CA 92807-3040 USA).

The author continues his exposition of principles underlying string scaling for harps.

"Novice's Guide to Amplifying Harps" by Peter Macauley, also in Folk Harp Journal #90, Winter 1995 (address above).

Advice on using microphones and piezo-electric pick-ups for amplification of harps.

"Kinetic Sound Environments as a Mutation of the Audio System" by Gordon Monahan, in **Musicworks** 63, Fall 1995 (179 Rich-

Continued of page 42